Safety Maintenance and Production

EST. 1901 • AMERICA'S PIONEER MAGAZINE IN ITS FIELD • AUGUST, 1965 • 50 CENTS

Specialty
Safety Products

MUFFLES HARMFUL PLANT NOISE!

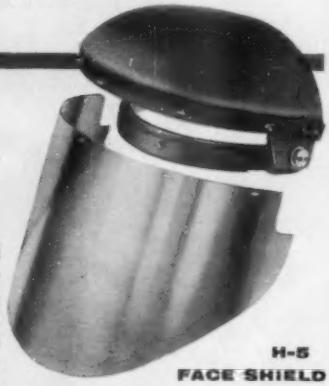
124SB-3
*Straightaway** SOUND PROTECTOR

A new addition to AO's Sound Protector line which accommodates larger ears, cuts out harmful noise. This headband is rugged and will withstand abuse . . . is adjustable, padded and all connection insulated. Oval shaped earcups fit snugly, stay comfortably in place and are especially designed for larger shaped ears — also to seal opening at jawbone section. The 124SB-3 is available with built-in earphones also.

NO. 338 LADDER SHOES

AO HEAVY DUTY CORK TYPE AND STEEL POINT LADDER SHOES For prevention of accidents due to skidding or creeping ladders. Fit all standard ladders — provide maximum safety on all surfaces. 3 types. Both cork style shoes are recommended on floors of metal, slate, tile, marble, concrete and wood. Steel point grip ladder shoes are recommended on wood block floors, bare ground and soft or icy surfaces. No. 338 tread with 2 composition cork pads. No. 339 has single solid oval tread of composition cork. No. 340 has a spike with hardened steel point. ALL CORKS OR STEEL POINTS REPLACEABLE.

NEW!
SPLASHPROOF AO H-5 FACE SHIELD



H-5 FACE SHIELD

Features a full crown or spark deflector, new quick-fastening studs in front and end clips which hold window securely. Chemical splashes cannot enter between window and headgear, offer excellent impact protection also. Available with acetate windows (clear or green), 24-mesh screen, and fibre. All windows optically correct and extra large (18¼″ x 10″).

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American Optical
SAFETY PRODUCTS DIVISION

†T.M. REG. BY AMERICAN OPTICAL COMPANY

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

(For details, use Key # H-1 on card on page 71)

Complete Instrumentation for NOISE MEASUREMENT and ANALYSIS

In safety maintenance and production, Industry is increasingly conscious of the importance of knowing the amount of noise present throughout all operations.

General Radio Company, since 1935, has pioneered in the development, design and manufacture of instruments for both the measurement and the analysis of noises of all types. G-R instruments are completely self-contained, portable, battery-operated and simple to use.

Type 1555-A
Sound-Survey Meter:
$135.00

For preliminary surveys to determine the overall level of sounds present, to ascertain whether the levels are such that more detailed measurements and analyses are required, and for routine maintenance check-ups, this Sound-Survey Meter is being used widely.

Pocket size, inexpensive, accurate, stable, reliable and very simple to use, it has been instrumental in solving many sound-survey problems.

It is calibrated to read directly from 40 db to 136 db, a range sufficient for most levels encountered in industry. It is unobtrusive, can be held and operated in the palm of one hand and is entirely adequate for most preliminary studies and maintenance problems.

Type 1551-C
Sound-Level Meter:
$350.00

This is the basic instrument in G-R's line of sound-level equipment. It is used for more refined and specialized measurements sometimes not possible with the Type 1555-A instrument.

The range is from 24 db to 140 db ... covering the noise from the quietest broadcast studio to the blast of a diesel engine's horn. It is calibrated in terms of the standard ASA reference level and is especially designed to maintain the highest accuracy, stability and reliability possible in any commercially-available instrument.

Type 1550-A Octave-Band
Noise Analyzer:
$535.00

In some critical cases of noise measurement and location, it may be necessary to isolate the frequency band of the offending sound. From data readily obtained with the Type 1550-A Analyzer (used in conjunction with the Type 1551-A Sound-Level Meter) the amplitude of the 'pitch' of the noise can be measured in eight frequency bands between 20 and 10,000 cycles.

Data obtained with these instruments are invaluable in isolating the specific noise-producing elements of the overall sound produced and being studied.

ACCESSORIES—Our complete line of noise equipment includes auxiliary accessories such as narrow-band sound analyzer; a-c operated power supplies; dynamic, condenser and high-level microphones for special measurements; vibration measuring and analyzing meters, sound-level calibrators and others.

Write for the free copy of "G-R Sound Measurement Bulletin"

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40 Years of Pioneering in Electronics

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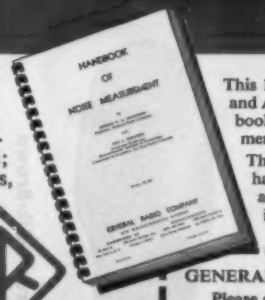

This 118-page manual, written by Drs. L. L. Beranek of M. I. T. and A. P. G. Peterson of General Radio, is a comprehensive handbook describing simply and fully the standard measuring equipment and techniques, and methods of interpreting the results.

This up-to-date book is available from us at cost of printing and handling. To avoid extra clerical work, it will be appreciated if a check or dollar bill is enclosed when ordering. A coupon is included here for your convenience.

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- ☐ Complimentary copy of G-R Sound Measuring Catalog describing all G-R sound and vibration equipment
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(607)
Company .....
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City ..... Zone .... State .....

(For details, use Key # H-2 on card on page 71)

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Safety Maintenance and Production

formerly "Safety Engineering"

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- classified
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in the

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WHAT safety and maintenance products to use...
WHEN to use them...
HOW to use them...
WHERE to buy them...

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(For details, use Key # H-4 on card on page 71)

SEND THIS PERSONAL SAFETY MESSAGE

TO EVERY ONE OF YOUR EMPLOYEES!

Safety is made attractive...vivid...colorful...

each worker clearly sees how safety benefits him.

You get enthusiastic safety cooperation instead of

tolerance...from every employee...every month.

YOUR
Safety News
PUBLISHED IN THE INTEREST OF YOUR SAFETY
THE JOHN DOE COMPANY, INC.
PROTECT YOURSELF
3
WAYS
There are three safe practice ways that do the most good in keeping free of accidents, all based on your personal desire to know safety and keep yourself safety-minded by studying the hazards of your work. They are
1 Make sure all guards are in place and working and wear the personal protective equipment your job requires.
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3 Report, avoid or eliminate all unsafe conditions.
As we see it: Safety is part of every job and like any craft it requires skill.
John Doe

Size 5½" wide x 8½" deep

...talks the worker's language!

Full of color, pictures, humor and snap, it makes safety interesting and down-to-earth. 12 times a year it covers every accident hazard. Nationwide, leading industrial firms state it's the *only safety paper their employees will read* . . . and take home to their families.

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makes YOUR SAFETY NEWS your own publication . . . a good-will ambassador . . . another force for better industrial relations.

Every employee feels bucked-up by a note from the boss. If you desire, your facsimile signature can be printed here.

Your Signature Here

NOTE:
Your Safety News is designed to promote better employer-employee relations. Every item is carefully weighed from this viewpoint.

INSIDE PAGES
(pages 2 and 3)

So Goes the World
Lions & Machinery have Hungry Jaws
YOU DON'T HAVE TO TWIST ITS TAIL
NEVER REACH INTO MACHINERY WHILE IT IS RUNNING!
Guard Well
WANTED
from the CARELESS ACTS of others the WISE MAN corrects his own
SAFETY SHOES
WORK OVERTIME
Dress for Safety
SAFETY SHOES
FALLS
FALLS KILL 40 EVERY DAY

IN YOUR EMPLOYEE'S INTEREST

Your employee's self interest in his own safety is always emphasized. Even household hazards are covered to keep him safety-conscious every minute, not only in the plant, but at home and on the way to work.

CHOCK-FULL OF ILLUSTRATIONS

Artwork is carefully chosen to lodge home each point. The cartoon style makes YOUR SAFETY NEWS as familiar and as welcome as the Sunday supplement.

THE "FOLKSY" APPROACH

Keeping the contents folksy, adding the grace note of humor, delivers your safety message with a nudge instead of a bludgeon. Your monthly chat gets enthusiasm instead of tolerance.

VIVID COLOR

Generous use of color gives sparkle, adds to the attention-riveting qualities of YOUR SAFETY NEWS. Each issue is as lively as any news-stand favorite.

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YOUR SAFETY NEWS may be ordered with either the Standard Imprint or with your Own Special Imprint. The Standard Imprint reads PLEASE COOPERATE FOR THE SAFETY AND HEALTH OF ALL . . . signed . . . A SAFE WORKER.

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NOTE: Although a personal signature is effective, some firms substitute: SAFETY DEPARTMENT, YOUR SAFETY COMMITTEE, A SAFE WORKER, etc.

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It's Safe to Say

● SAFETY ENGINEER'S NIGHTMARE

SAFETY ENGINEERS from one end of the country to the other have had their nail-biting moments of frustration. Especially is this true when dealing with rugged individualists or others who disregard safety rules and practices devised for their own protection.

Imagine, if you will, how this form of frustration can be intensified when the working staff consists of inscrutable, placid orientals trained from infancy to develop a fatalistic attitude which decrees that "what is to be, will be." The very thought of trying to inculcate safety into such minds is enough to bring on the birth of king-size ulcers!

And yet Lt. Col. Arthur M. Cory describes just such experiences as Ordnance Corps advisor in Korea elsewhere in this issue. Col. Cory points out that we in this country have taken for granted our national emphasis on safety, just as we have accepted so many other good things that we describe as the American way of life. To appreciate properly the results in life conservation built up in the United States, we need spend only a comparatively short time in another country. We soon would have a perfect answer to those dyspeptic pessimists who have decried the superb accomplishments of the safety movement within our own country.

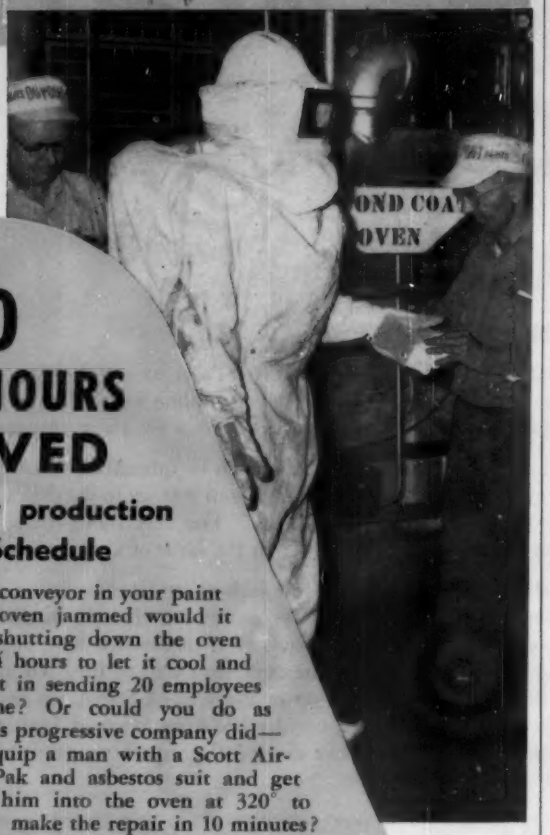
Books, plays, motion pictures and now television have acquainted us with the oriental unconcern with death, sudden, accidental or otherwise. For generations, we have been told that masses of humanity in the far east are comfortably resigned to what they consider their fate, regardless of what form that may take. It is perfectly true that many orientals educated in the west have become imbued with our generally accepted philosophy that the best thing in life is life itself and that we of the western world are constantly and tirelessly devoting our energies to preserving that life. Witness the Geneva top-level conference just brought to a close. The whole idea behind that meeting of world leaders stemmed from our desire to avoid the horrors of another war.

But to too many living in the far east, the loss of an eye, hand or leg or death by accident may be a sad occurrence but is to be accepted as a manifestation of one's fate. Imagine the hours of almost heart-breaking discouragement in trying to revise the thought processes of a whole people. Ulcers? It is a wonder to us that Col. Cory and others who accomplished so much did not return from Korea in a state of complete nervous prostration. Talk about the patience of the oriental! What greater example of patience can be imagined than that displayed by men trying to show a fatalistic people that accidents can and must be prevented?

If the average safety director of an American plant thinks he has a tough job in spreading the gospel of safety, let him read Col. Cory's report in this issue and take comfort in the knowledge that he dosn't know to what lengths safety troubles can really go!—H.A.

Scott Air-Paks

Cut Repair and Maintenance Costs, Safely!



200 MAN HOURS SAVED

in busy production Schedule

• If the conveyor in your paint drying oven jammed would it mean shutting down the oven for 24 hours to let it cool and result in sending 20 employees home? Or could you do as this progressive company did—equip a man with a Scott Air-Pak and asbestos suit and get him into the oven at 320° to make the repair in 10 minutes? A similar, costly interruption *could* happen in *your* plant tomorrow! 200 Man Hours is a lot of time to lose in a busy production program. Better take steps now to get on that 10 minute schedule!

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SAFETY EQUIPMENT DIVISION

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(For details, use Key # H-5 on card on page 71)

the future shows

Portland, Ore. *September 12–13*

The Second Annual Pacific Northwest Industrial Health Conference (Multnomah Hotel). R. Walter Ager, attendance chairman, Pacific Northwest Industrial Health Conference, 824 S. W. 5th Ave., Portland, Ore.

Cleveland, Ohio *Sept. 13–15*

Seventeenth Annual Ohio State Safety Conference and Exhibit (Hotel Carter). Michael L. Stefani, General Manager, Cleveland Safety Council, 2073 E. 9th St., Cleveland 15, Ohio.

York Harbor, Me. *September 15–16*

Twenty-eighth Annual Maine State Safety Conference (Marshall House). Arthur F. Minchin, Secretary, Department of Labor & Industry, State House, Augusta, Me.

Chicago, Ill. *Oct. 17–21*

Forty-third National Safety Congress and Exposition (Conrad Hilton and other hotels). R. L. Forney, secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Charleston, S. C. *November 3–4*

Eighteenth Annual South Carolina Accident Prevention Conference (Francis Marion Hotel). J. Donald Watson, Jr., Secretary-Treasurer, P. O. Box 539, Columbia, S. C.

Kansas City, Mo. *November 14–18*

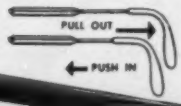
Eighty-third Annual Meeting of the American Public Health Association and related organizations (Municipal Auditorium). Dr. Reginald M. Atwater, executive secretary, American Public Health Association, Inc., 1790 Broadway, New York 19, N. Y.

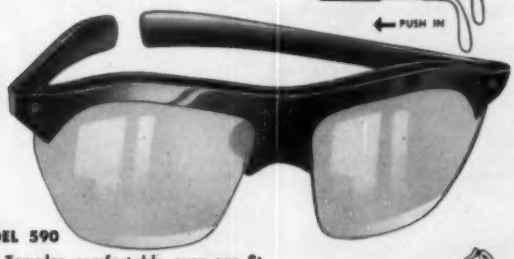
WATCHEMOKET eye SAVERS

New EXECUTIVE SAFETY SPECTACLE

with Interchangeable, Curved, Shatterproof Lenses
Smartly Styled, Lightweight, Curved to Fit Forehead

MODEL 595 Adjustable Retrax Temples





MODEL 590
Club Temples comfortable over-ear fit

These **EXECUTIVE** Eye Savers include important new features which are not available in any other type of safety spectacles. They were designed by professional men in the optical industry for comfort and multi-purpose eye protection. They represent the highest standards of quality known to the optical industry.

FEATHERLIGHT COMFORT . . . a combination of light weight and perfect balance, plus a universal nose bridge which rests comfortably *on* the nose without pinching at the sinuses.

MAXIMUM SAFETY with better visability . . . large lens size and curved frame design hug the forehead and close the gap at the corners of the eyes.

ONE SIZE FRAME for everyone . . . choice of Eye Savers patented Metal Retrax adjustable temples or comfortable form-fit plastic Club Temples . . . fit and flatter almost every face . . . man's or woman's.

MULTI-PURPOSE USE . . . Executive Safety Spectacles have Extra Lenses which are easily interchanged (snap in — snap out) to get the desired protection: clear lenses protect from impact hazard of flying particles, green lenses provide full protection from impact and from an arc burn six feet or more from the arc (also provide excellent protection from sun glare), gold lenses help visual performance by reducing eye strain when driving against headlights or in fog . . . also may be used for safety in a plant. The Executive is furnished with protective carrying case, large enough to hold all extra lenses in their individual pouches.

SNAP IN-OUT

CHOICE OF INTERCHANGEABLE LENSES

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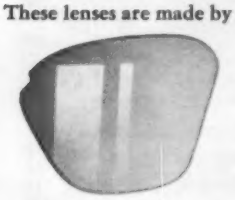

- **CLEAR** Safety Lenses for indoor hazardous areas.
- **LIGHT GREEN** Safety Lenses for average sunlight.
- **MEDIUM GREEN** Safety Lenses for bright sunlight.
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ALL LENSES FURNISHED WITH PROTECTIVE POUCH.

SPECIFY LENS BY CODE NUMBER

Clear	Light Green	Medium Green	Gold
SC1	SG2	SG4	SY1

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(For details, use Key # H-6 on card on page 71)

The ARCHITECT knows that ALGRIP

—the *only* abrasive rolled steel floor plate in the world—means permanent safety against slipping accidents in any industrial plant . . . even on wet, greasy or oil-splashed floors or ramps.

He also knows . . .

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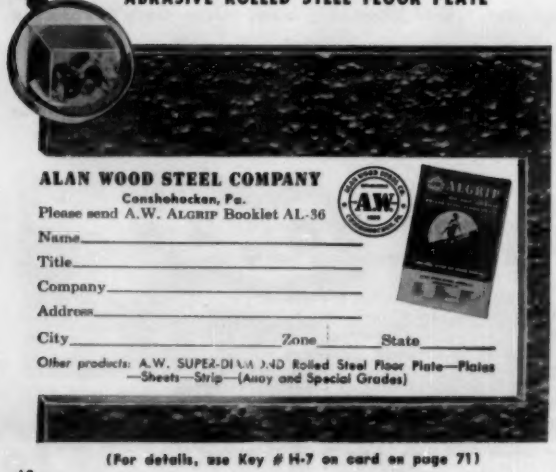
—that ALGRIP is approved for safety by the Underwriters' Laboratories.

A.W. ALGRIP

ABRASIVE ROLLED STEEL FLOOR PLATE



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Title_____
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City_____ Zone_____ State_____

Other products: A.W. SUPER-DIAMOND Rolled Steel Floor Plate—Plates—Sheets—Strip—(Alloy and Special Grades)

(For details, use Key # H-7 on card on page 71)

Check List of Production Aids:

Through Safety—

Feed Roll Guard 20
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Foot Protection Program 32
Noise Protection Devices 35
Safety Publications 47
Non-Skid Floor 50
Life Preserver Jacket 50
Highway Flare 63
Finger Film Badge 69
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Safety Prescription Glasses 74
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Through Maintenance—

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Paint Spray Filters 38
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Tube-Axial Fans 43
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Hand Cleaner 69
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Through Fire Protection—

Fire Protection Publications 47
Water-Spray Technique 56
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Burglar Control System 70
Dry Chemical Extinguisher 70
Fire-Resistant Hydraulic Fluids 70
In-Plant Fire Truck 73
Aluminized Fire Suit 73
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FIRE EXIT
CAUTION
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THINK
THE BEST SAFETY DEVICE IS A CAREFUL WORKER
GET THE SAFETY HABIT
DANGER
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SAFETY FIRST
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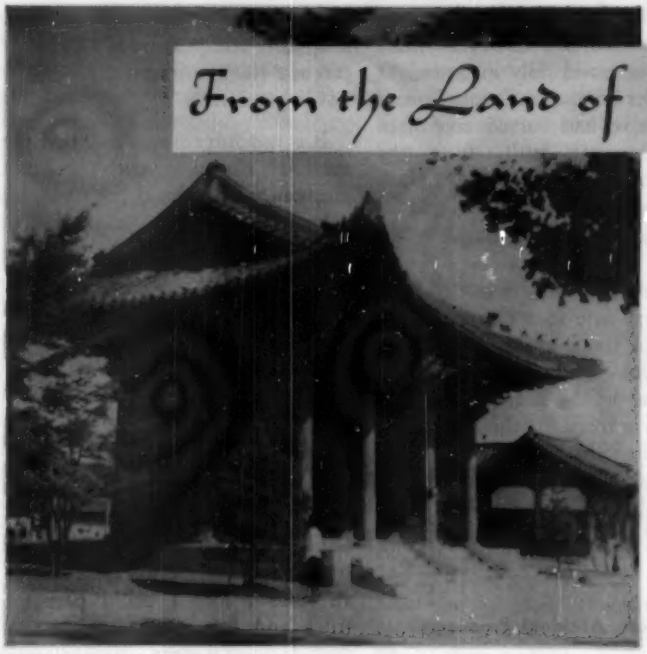


From the Land of "SAFETY LAST" ... A REPORT TO Safety Engineers

by **ARTHUR M. CORY**
Lt. Col., Ord. C,
USAR

FIRST OF ALL, I might as well admit that until recently I had never seen much excuse for safety experts. Back in the early days of World War II, those of us assigned to the staff of an Ordnance motor maintenance school felt that we were being harassed above and beyond the call of duty by the safety engineers who were constantly dogging our tracks. We believed that we were taking more than normal precautions, and that the safety experts peering over our shoulders were only trying to justify their existence.

Went Along With Them . . .

For the most part, we went along with them. It was the path of least resistance, we reasoned; they meant well, they weren't doing any real harm, and if we kept them happy they kept out of our hair. There were some things we wondered about, of course. One day an inspecting colonel came in while we were sweeping up. Taking a quick glance at the floor he barked at us, "Too much dust. Put more oil in the floor compound."

So we put more oil in the floor compound. The next day our civilian safety expert came in while we were sweeping. He took one look at the oily mixture and yelled, "Floor too slick; someone will fall. Don't use so much oil." In disgust we quit using floor compound entirely, swabbing the floors with water instead. This left a powdery residue on the floor and rusted our tool stands, but at least no one objected to it.

But Took the Credit

We had only a few accidents—all minor—despite the hundreds of students who went through the school. I'm afraid that in those days we took most of the credit for our safety record, and that we were inclined to discount the work of the safety engineers who watched over us. In fact—and I'm speaking as an individual now—it wasn't until I had spent several months as an Ordnance Corps advisor in a Korean motor school that I really understood the need for an intensive program of safety education. As we have done with so many other things in this country of ours, we have taken the universal stress on safety for granted; we haven't recognized its real significance. We need to live for a while in another country in order to appreciate the importance of the work sponsored by safety organizations in America.

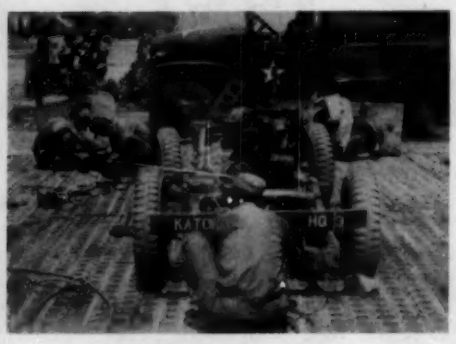
For the American emphasis on safety is a tribute to the value we place on human life. In some parts of the world today life is very cheap, however—so cheap that safety practices, if not actually unknown, are at least considered a waste of time and effort. That seemed to be the general feeling in Korea. The 5 sergeants who worked with me there—good American GI's, to whom the habit of safety was as natural as the habit of breathing—shared my incredulity and dismay at the lack of safety consciousness we saw all around us.

"Safety First" Unknown

The expression "Safety First" seems to be unknown to most Koreans; safety is the *last* thing to be considered. One of the reasons for this attitude stems from the oriental unconcern about death; people of the Far East are inclined to be comfortably resigned to Fate Their pragmatic fatalism makes them oblivious to the loss of an eye or an arm, a leg or a life. If they are to be hurt or killed, so be it; there is no need to take elaborate

precautions against something that can't be controlled.

This point of view, of course, is not exactly conducive to the avoidance of accidents. Like so many monkeys, workmen climb all over improbable scaffoldings of skinny bamboo poles loosely tied together with woven rice-straw rope. Or they load their "A-frames," which they carry on their backs, with incredible loads; I once saw a small Korean staggering down a street in Pusan carrying an engine which weighed considerably more than he did. School boys dash through traffic to climb on the tailgates of lumbering trucks; when they want to get off, they simply jump, usually rolling end over end when they hit the ground. The old and young alike hitch rides on asthmatic buses by



Maintenance the Korean way . . . squatting on mats outdoors. When they work on something they don't know when to stop. This jeep probably had a flat tire to start with.

perching on rear bumpers or by clinging to spare tires. Everywhere there is a complete disregard of even the most basic concepts of safety, and the accident rate is astronomically high.

Superstition Causes Accidents

Another reason for the high accident rate is superstition. Many Koreans are dominated by a fear of evil spirits. Parenthetically, this fear of evil spirits has also been responsible for one of the most attractive things in the orient—the lovely sweeping curves of the roofs. The spirits that plague men reside on the ridge line of a house; from this point they slide down the roof to land on the shoulders of anyone who steps out. Fortunately, however, these spirits can travel only in a straight line, so for hundreds of years Korean houses have had curved roof lines to deflect evil spirits from the shoulders of their victims.

Shadow or Real Death

Still another belief is that evil spirits lurk in a man's shadow. To get rid of these spirits, Koreans of all ages have an unnerving habit of darting across the street in front of a jeep or a truck. If their timing is good, the truck runs over the shadow and destroys the evil spirit. If the timing is bad, the Korean suddenly joins his honorable ancestors.

3 More Accident Producers

Three other things combine to make Korea a safety engineer's nightmare. One is the Korean's lack of familiarity with motor vehicles and power tools. Another is his lack of imagination—his inability to visualize what might happen in a given situation. Still another is his reluctance to admit that he doesn't understand directions or instructions. Most of us have something of this feeling, of course, but the oriental has a king-sized objection to such an admission; it causes him to look foolish, or to lose face.

In all fairness, we should realize that the Korean is not to be blamed for his lack of mechanical background. His is a country of two-wheeled ox carts, of A-frames strapped on the back. Water is carried in crude buckets suspended from a yoke that rests on the shoulders; food is cooked over charcoal pots. A short stick, a flat stone, and the nearest puddle of water constitute a washing machine. To build the terraces that crawl up the sides of mountains, 3-man shovels are used: one man guides the handle, while 2 other men pull the shovel forward with ropes. To raise water from one rice paddy to a higher one, men climb endlessly up a vertical wheel; dippers mounted on the wheel scoop up water, carry it upward, and pour it out. Decrepit cars and trucks are seen in cities, but not in rural areas.

It is not surprising, then, that the average Korean youth is not mechanically inclined, or that his behavior is highly unpredictable when he climbs into the cab of a powerful truck. He learns by joyous but appalling experimentation, with no thought of safety either for himself or for others. He has all the faults of the beginning driver: he moves from a parked position into the line of traffic without looking back, he fails to use hand signals, he blares across intersections, he overdrives his brakes, he overblows his horn. I once tailed a loaded dump truck for several miles at 55 miles an hour before I could pass the truck and flag it down. Most of that time we were in a 30-mile zone, although we tore through one small village zoned at 15 and swarming with tiny children, aged papa-sans, school girls, dogs, and American soldiers. Another time, caught in a traffic jam, I brought my jeep to a slow stop—only to be hit from the rear a half minute later by a Korean driver who hadn't heard about momentum.

What's the Fuss?

Nor is their carelessness confined to driving. Regardless of how closely we watched them, the students in the Korean motor school were constantly coming up with new ways to maim, lame, or exterminate themselves. The first time I inspected the motor pool I found several Korean soldiers casually crawling around under a 2½-ton truck. Both front wheels had been removed; the entire front end was supported on 2 flimsy screw jacks borrowed from nearby jeeps. The base of each jack was about 5 inches square, and the rear wheels of the truck were not chocked. A sudden gust of wind, or someone leaning against the truck, would have pushed it off the jacks. The Koreans couldn't understand why I made such a fuss about it.

They couldn't understand, either, why I wanted them to wear goggles when they were welding, but eventually they agreed to do it. The next time I checked the arc welding class, the men were wearing goggles —but they were clear, not dark. The instructor explained, through my interpreter, that the students couldn't "see through the dark glasses!" Then there was the day I saw black, oily smoke rolling out of the welding shop. I dashed in with a fire extinguisher, only to find the latest development in the technique of lighting a welding torch: with dozens of spark lighters in the tool crib, the students had set fire to a piece of oil-soaked rope. It smouldered on the floor; when they wanted a light they blew on it and lighted the torch from the glow.

Wires—but No Plug

Another day I came upon a student using an electric grinder which cut off and on intermittently as he worked. I traced the grinder wire off the bench, under the edge of the tent, and over to the pole where it was connected, only to find there was no plug; the loose ends of the wire had been twisted together and pushed into the outlet. When I asked why they had taken it off, they shrugged their shoulders. I waited until the plug had been replaced. A week later it was gone again; no one knew why.

Courteous—Not Safe

Our Korean friends listened impassively while we talked to them about the prevention of accidents. So long as we were in their vicinity, they did their best to do as we had suggested. This was not because they were sold on the virtues of safety, but because in their courteous way they wanted to please us, however zany our ideas seemed to them. They didn't really understand—or at least didn't believe—our warnings about a potentially dangerous situation until after the accident had happened. Once there had been an accident, however, they were convinced; they saw there was a reason for what we had been saying and, as the army would phrase it, "they took steps to correct the situation." Sometimes they even seemed to feel that an accident was a fortunate thing, to be turned to their advantage—as they did in the case of the wrecker truck.

Warning Goes Unheeded

In June, near the end of the rainy season, a demonstration of the 4-ton wrecker truck had been scheduled for one of the classes. Although we had repeatedly told the instructor to send the students to the demonstration area in a separate truck, he allowed them to perch all over the rigging of the wrecker. While crossing over a narrow dike between two rice paddies, the driver attempted to pass an ox-drawn cart. The rain-soaked shoulders of the dike were soft, and the big truck began to slide. Moving slowly and deliberately, the wrecker slid sidewise and crablike to the bottom of the 20-foot slope. There, still in ghastly slow motion, it turned over on its back and lay still. Of the 35 Korean students on the truck, 31 were able to jump off. The others, tangled in the cables of the wrecker, were drowned in the mud and water of the rice paddy.

When I talked with the commandant of the school I expressed my regret for the tragedy as best I could. Then I reminded him that for a long time we had been saying that it was dangerous for students to ride on the wrecker.

"Yes," he agreed, "is terrible thing, I think." Then he smiled cheerfully. "But is good for instruction. I think now we not do that any more."

But Not Any More

And there you have it. There was a time when I made snide remarks about safety experts and all their works, but not any more. I'm convinced. I've lived in a country where safety precautions were unheard of, and I've seen the terrible things that happen when safety is disregarded. From now on, my hat is off to the safety engineer; he's my boy, and if he tells me to wear goggles when I turn the crank on a pencil sharpener I'll do it without argument.

This wrecker truck, loaded with Korean soldiers who had been warned not to ride it, tipped over into rice paddy, killing three. Korean comment: "Maybe not do that anymore."

Accident Statistics

THE BUREAU of Labor Standards has just released 4 publications in a series, designed to improve injury reporting systems throughout the country, and to provide fullest use of the data compiled. The series was prepared by authorities in the field of injury statistics and have been made available at the request of the Committee on Accident Records, Analysis and Use of the President's Conference on Occupational Safety.

These will be helpful to plant owners, both large and small, state administrators, safety engineers, and others interested in improving the collection of comparable injury statistics in the United States.

Subject titles of the first four in the series are: 1. Accident Causes and Cause Coding (15 cents); 2. Estimating Costs of Industrial Accidents (10 cents); 3. Investigation of Accidents for Cause and Remedy (5 cents); and 4. Work Injury Rates (10 cents). A small supply of these bulletins is available for free distribution. Copies may also be purchased, at the price quoted, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

LIGHTING & ELECTRICAL SERIES
next article in September

A roundtable on... LIGHTING EQUIPMENT —Its Selection and Upkeep

Chairman: **CARL W. ZERSEN,** Managing Director, Chicago Lighting Institute.

Panel Members: **JOSEPH HERBENAR,** Lamp Specialist, General Electric Co., Chicago.
ERIC CHURCH, Research Engineer, Benjamin Electric Mfg. Co., Des Plaines.
RALPH LUSK, Lighting Engineer Commonwealth Edison Co., Chicago.

Chairman Zersen: Some 39 percent of the population has defective eyesight at the age of 30; for those of 40 the figure is 48 percent; for age 50, 75 percent; and for age 60, 82 percent. Good lighting, however, results in less eyestrain for all ages, and helps to make up for visual defects.

One way to see fine print is to put a magnifying glass on it. You can accomplish the same result, however, by putting more light on it. Better lighting results in greater accuracy of workmanship, in fewer rejects and improved quality. It is a factor in better housekeeping, because it enables cleaners to see the dirt in the corners. It makes for better morale, less fatigue, and fewer accidents.

In addition, better lighting can actually increase production since people see more quickly with good light. This can be demonstrated with a rotating disk lighted alternately with bright and dim lights. In the bright light the disc appears to rotate more slowly because the eye itself has been speeded up. The same effect occurs on a camera; taking a picture on a dark day requires a longer exposure.

Good lighting depends on both the quality and quantity of light, whether or not there is glare, either direct or reflected. The quantity of light may be expressed in several different terms. A "foot-candle" is the intensity of light from a standard candle on a surface one foot away. A "foot-lambert" is the term used to express the product of foot-candles and reflection factor of the surface you are viewing; the "reflection factor" can be measured separately.

If you have 100 foot-candles strike the point of a tool, but only 50 percent of it is reflected back to your eye, then 50 percent is lost. For many of these measures, meters are available. For example, there is a meter to measure foot-candles, and another to measure the brightness, which is determined by the amount of light in foot-candles and the reflection factor. Still another type of meter will measure the visibility. In this case the standard is 10 point Bodoni type read at a distance of 14 inches under an illumination level of 10 foot-candles. The meter reading gives the number of foot-candles necessary to provide equally comfortable seeing for any given job.

Lighting equipment is divided into two main types—distributing and concentrating. The distributing type distributes the light more or less equally throughout the room; the concentrating type, used in high-bay units, concentrates the light on the work plane. In the latter case, the lighting units should be about as far apart as the luminaires are above the floor.

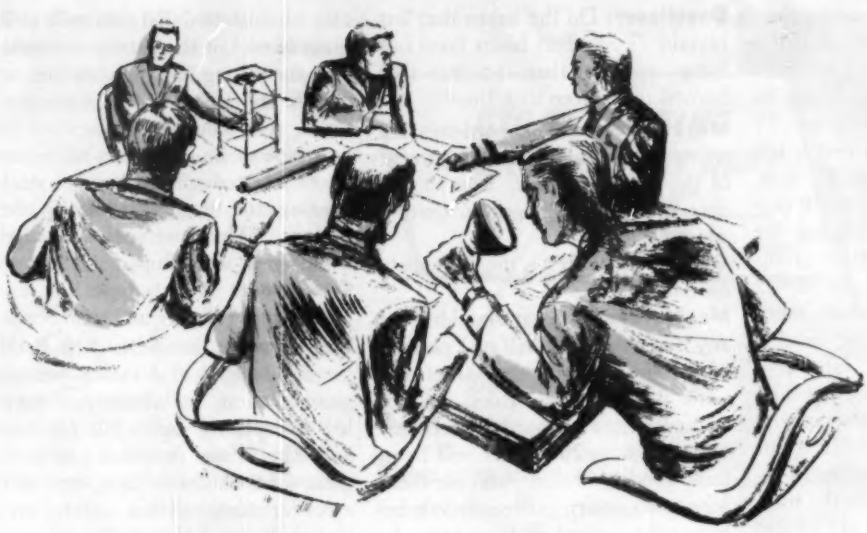
Trend to Quality Lighting

Shielding is also important to protect the eye from excessive glare. The trend here is to provide shielding for factory lighting comparable to that provided for office lighting. I think the day when the factory interior was the orphan child has passed. Some manufacturers are producing factory fixtures which direct as much as 25 percent to 40 percent of the light up to the ceiling. When you step into an area like that you know you have quality lighting.

Progress has also been made in the development of lamps with longer

Here are some general rules to keep a lighting system at top efficiency:

1. **Make periodic checks with your light meter—it's pretty hard for the eye to determine just how much the illumination level has fallen off.**
2. **Establish a regular cleaning schedule.**
3. **Clean and repaint walls and ceilings.**
4. **Establish an economic plan for replacing fluorescent lights.**
5. **Keep a stock of spare parts.**
6. **Make periodic voltage checks.**



life. Today fluorescent lamps are available that last 5 times longer than the first fluorescent tubes in 1939, are 80 percent more efficient and cost 60 percent less.

Attention has also been given to specialized lighting problems. For example, there is a device called an "examinolite" which shows color comparisons at different levels of illumination for inspection jobs. Polarized light is being used in some cases to detect the effects of stresses and strains in glass, clear plastic, and similar materials.

The most important factor in maintenance of lighting is keeping the fixtures clean. For example, if you have an investment of 20 thousand dollars in lighting equipment and the lighting level has decreased 50 percent because of the accumulation of dirt and dust, you have a practical waste of 10 thousand dollars of your investment capital. Not only that, but you're paying for current you're not getting any use from.

Mr. Herbenar: Costs of an industrial lighting system will, of course, largely be determined by the type of fixtures used and the cost of the power. For the average plant I estimate the cost of replacing lamps is around $1.40 per lamp, and the average cost of power somewhere around a cent or two per kilowatt hour. For every thousand dollars worth of lamps you buy, it's going to cost you at least a thousand dollars worth of maintenance, and perhaps 8 thousand dollars for power. The cost of depreciation of fixtures amounts to about another 2 thousand dollars. Thus, for every thousand dollars worth of lamps you buy, your lighting cost will be around 11 to 12 thousand dollars.

More than the Lamp Cost!

Statistics from a number of industrial plants indicate that the cost of replacing a 40-watt fluorescent lamp is $1.40—in other words more than the cost of the lamp itself!

Some people tell me that it doesn't cost anything to replace a lamp, because they have a man there anyway. I tell them that it doesn't cost a railroad anything to haul an extra passenger to New York, but they won't get very far arguing that he should ride free on that account.

There are, of course, some ways you can cut down the cost of spot replacement a little. For example, I know that one plant maintains a stock of lamps on the floor, which saves the man who makes the replacement a little time, though it probably increases storage cost somewhat. In some large companies, a man starts through the plant on Monday morning replacing the lamps that have burned out the previous week. With a relatively good system of spot replacement you can probably cut the labor cost to 90 cents.

Now there are two things we know about lamps: one, that they will burn out eventually; and, two, that the light output depreciates with burning time. The average life of a 40-watt fluorescent light is 75 hundred hours (10 thousand if it is burned 12 hours per start), and about the end of its life it is down to 75 percent of its original light output. At 5 thousand hours the output would be about 84 percent.

Suppose you had 100 lamps and changed no tubes for 75 hundred hours. Just before the burn-out, those 100 lamps would be providing the light output of only 75 new lamps. In addition to that, under average conditions, 50 percent of those lamps would have burned out before 75 hundred hours, and the actual light output would be even less. At 5 thousand hours only 10 percent will have burned out. Group replacement before the 75 hundred hours are up will cut the cost of replacement.

(Continued on the next page)

If lamps are replaced when they burn out, the labor cost for 100 lamps is 90 dollars for 75 hundred hours, and the cost of the lamps 88 dollars. Thus, for any given 75 hundred hour interval the cost is 178 dollars. On the other hand, tests have shown that only about 10 percent as much labor is needed for group replacement. If the group replacement were made at 5 thousand hours, somewhat more than 100 lamps would be needed per 75 hundred hour interval—about 10-sevenths as many to be more exact—thus the cost of the lamps would run to $125.71. With labor costs at 9 cents per lamp instead of 90 cents, however, the total labor cost would be only $12.86 and the total cost of the replacement $138.37. If group replacement were to be undertaken at a shorter interval—say after 6 thousand hours when only 20 percent of the lamps would have burned out, the cost would be $143.75.

As I look at it, however, the biggest advantage of group replacement is that it gives you a chance to clean your fixtures at the same time, and put the operation on a mass production basis: one man removes the lamps; the next one cleans the fixture; the third one replaces it. The cleaning also increases the amount of light you get out of your installation.

If you were to put in a new installation and you started at 50 foot-candles and did nothing but replace the lamps as they burned out, within 5 years you'd be down to about 25 foot-candles. I've made some actual measurements in a store, (the loss would probably be greater in a plant because of more dirt) and after 5 and a half years the lighting was down to 60 foot-candles. Simply by washing the fixtures and replacing all the lamps at once, we raised the level to 140 foot-candles. Since a fluorescent lamp suffers its greatest light loss in the first 100 hours of burning, that was not considered a fair test—so measurement was made somewhat later. The level was 123 foot-candles, or double the previous intensity.

Questioner: Do the lamps that last beyond 75 hundred hours burn out faster or slower than the ones that burned out before that time?

Mr. Herbenar: The burn-outs are rather fast until about 90 percent of the lamps are gone. The 10 percent that are left linger on quite a while.

Questioner: What is the immediate burn-out?

Mr. Herbenar: That shouldn't be any larger than one-half of 1 percent of the group. Some companies save some of the lamps which are not burned out at group replacement time—perhaps 20 percent will be in fairly good condition—and use them for replacements in the intervals between the general replacements. In other cases, lamps are never re-used after group replacement; extra lamps are purchased to make replacements in the intervals.

Questioner: Where do the starters fit into the group replacement program?

Mr. Herbenar: We have never particularly recommended group replacement of starters. Actually there are several different types of starters and they act in different ways when a lamp burns out. The most common is the glow-switch—when the lamp burns out it keeps on trying to start it until it burns itself out or the cathode in the lamp gives way. The thermal reset starter will try to start the lamp 10 times or perhaps 15, then it will kick out of the circuit. The manual reset starter will automatically go out of the circut after a half a minute or so, and must be manually reset.

Mr. Church: One comparatively new development in fixtures is lessening the cleaning problem—that is slots in the top of the unit which permit convection currents from the heat of the lamp to carry off dust and dirt. These are available for both incandescent and fluorescent lamps.

However, there are two precautions to be observed with this type of fixture: first, if the slots are in the wrong place dirt will accumulate in spots and the cleaning problem, though not so great as in the case of unslotted fixtures, will still exist; second, if the fixtures are used near the ceiling in a high-bay area, a minute drop of moisture from the ceiling will blow the lamp.

A type of unit for steel mills has a concentrated reflector inside a steel housing, and toughened glass on the bottom. This prevents breakage from flying steel chips.

Questioner: What types of explosion-proof lights are there?

Mr. Church: Basically, hazardous locations are divided into 3 general groups: those in which you have highly explosive vapors like gasoline and ether; those in which you have grain dust, chocolate dust, etc.; and areas for storage of flax, cotton, etc. Generally speaking, all the fixtures that are suitable for group 2 are suitable for group 3—the dust is kept out of the fixture. You can't, however, keep vapor out; and, there is no such thing in reality as a vapor-proof fixture. The intent is rather, to make the luminaire sufficiently strong so that the explosion will take place inside the fixture, and the flame will be snuffed out there before it spreads. There are both fluorescent and incandescent explosion-proof units on the market today, but the incandescents go up to only 500 watts. There are no mercury-vapor units.

Questioner: What type of unit is approved for a spray booth?

Mr. Church: Underwriters Laboratories have no type of unit approved for a spray booth. Some manufacturers put a sheet of glass over the top of a spray booth and lay a unit on top of that. Others make a frame which they hang onto a fixture and permit that frame to open up in the booth itself. There is no generally accepted method of lighting a spray booth, however, I suggest you consult your insurance company and your local fire inspector.

Questioner: Could the reflector-type lights in class 2 be used for a boiler room? Some of the ventilators blow in the rain, and the light blows out.

Mr. Church: Yes, I think your best bet would be to buy a reflector to cover the lamp.

Questioner: We have an area where we must use an explosion-proof fixture. There's a lot of gasoline around, and the fixtures operate in a room where there is a water spray. We have had a lot of trouble with water collecting on the fixtures.

Mr. Church: There is one solution, but it may not be feasible for you: that is, put your fixtures outside the wall and shine them in through the windows with spots.

Mr. Lusk: To illustrate how lighting standards should be applied, let me describe the best lighting for a small machine shop, 96 feet, 6 inches by 76 feet, 7 inches, with a ceiling height varying from 10 feet, 6 inches to 16 feet. Ceiling and walls are grayish white with a reflection factor of 40 percent.

The Handbook of the Society of Illuminating Engineers recommends 50 foot-candles for medium bench and machine work—ordinary automatic machines, rough grinding, medium polishing, and 100 foot-candles for fine machine work. In this case 50 foot-candles is considered adequate.

The coefficient of utilization for a 2-lamp fluorescent closed top R.L.M. reflector mounted 9 feet, 6 inches above the floor is .70 and a medium maintenance factor is 55 percent. One hundred and one units with two 75 watt, 96 inch T-12 white, 48 hundred lumen fluorescent tubes are required. Lumen is the measuring term for the quantity of light given off by any source.

To get better quality, which is just as essential in a plant as in an office, we can use the type of fluorescent industrial fixture that lets 25 percent of the light go up, and has a 35 degree longitudinal shield to reduce direct glare. Although the coefficient of utilization is reduced to .57 for this area, the maintenance factor is increased to .65. Flue action results in dirt being deposited mostly at the edges of the top opening. Hence only 4 additional units are required to obtain a much improved lighting system for this machine shop.

From a panel discussion during the 5th national Plant Maintenance and Engineering Show.

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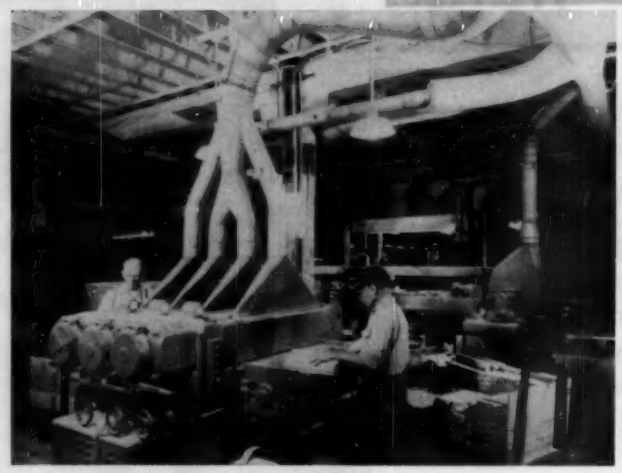
C-18

Feed Rolls and Lost Fingers in the Woodworking Industry



THE WOODWORKING industry's accident rate from fingers getting into feed rolls is not as great as that in which fingers actually come into contact with revolving cutters. However, in those instances where fingers do get into feed rolls the results are far more serious. Alert management in plants using machines where there is even a slight feed-roll hazard should make instruction in this operation a continually-recurring part of the safety program.

In many cases, feed rolls may be guarded enough to greatly minimize the danger; in various other cases this is difficult to do. Serious accidents have occurred at roll-type glue spreaders when the operator's fingers were drawn in between the rolls. However, glue spreaders are among many machines which can greatly reduce their accident potential through safety devices or special machine design.

In various cases and places, glue spreaders are equipped with a safety device which has 2 horizontal bars across the top of the machine, one at the infeed side and the other at the outfeed. Either the feeder or the off-bearer can easily reach one bar, both with his hands and the top part of his body. When either bar is pressed gently, feed of the machine is automatically stopped. Pressing harder against the bar reverses the machine rolls. It is claimed that a man with both hands caught in the rolls can release himself by thrusting the top portion of his body against the bar. As a result, the seriousness of the hazard is greatly reduced.

A new way of reducing feeding danger on feed rolls, is the substitution and use of an endless-bed machine instead of a roll-feed unit.* An outstanding example is the use of a modern endless-bed drum sander instead of a roll-feed unit. Even where short stock is being fed on an endless-bed machine, there is no necessity for getting the fingers anywhere near a feeding roll. The bed itself carries short pieces into engagement. Some of the more modern endless-bed sanders have proved particularly safe in this respect. Moreover, along with additional safety, greater production in feeding short-length parts is usually possible.

* The name and address of the manufacturer of this device may be obtained on inquiry to the Editor.

Injury Rate Dropping

THE INJURY-FREQUENCY rate for the first quarter of 1955 dropped 4 percent below the rate set during the corresponding period of 1954, establishing a new low for any first quarter on record, the U. S. Department of Labor's Bureau of Labor Statistics has announced.

Following a typical seasonal pattern, the injury rate rose from 10.0 in December 1954—the all-time low for any month—to 10.8 in January 1955. The rise continued in February, to 11.2 where it held through March. Each monthly rate, however, was lower than the rate for the same month in any previous year on record.

Although these early reports indicate a possibility that the injury record for 1955 might be lower than the all-time record set in 1954, there is strong evidence that the trend to lower injury-frequency levels, which started in the last half of 1953, may be easing off.

The majority of the individual industries showed only minor changes in injury-frequency rates between the fourth quarter of 1954 and the first of 1955. The largest increase was in the cold-finished steel industry, where the average injury-frequency rate increased from 6.3 to 15.6 in the first of 1955. Other sharp increases included: elevators, escalators, and conveyors, from 10.6 to 17.3; vegetable and animal oils, from 15.6 to 22.1; iron and steel forgings, from 17.2 to 23.1; miscellaneous chemicals and allied products, from 11.2 to 16.6; sausages and other prepared meats, from 16.6 to 21.8.

The greatest improvement in safety was recorded by the logging industry. This hazardous industry has reduced its injury rate from 74.7 injuries per million man-hours in the first quarter of 1954 to 69.2 in the fourth quarter and further, to 62.2 in the first quarter of 1955. The average for sawmills and planing mills decreased from 44.6 in the fourth quarter of 1954 to 37.3 in the first quarter of 1955; that for grain-mill products, from 21.6 to 16.4.

How to Clean MARBLE

THE USE TO which marble is put and the kind of care it is given largely determines the method by which it must be cleaned. For example, the difference in use between a marble foyer floor which is walked on all day by hundreds of people and a marble wall in a seldom-used vault call for different cleaning schedules and methods.

Exterior building marble will remain in the best condition if washed down frequently with a good pressure hose. This is true for any finish, carving, lettering, etc. Dirt adhesion is progressive if allowed to continue; buildup of dirt starts with one bit of dirt clinging to an earlier piece of dirt which has not been washed off. Do not use acid cleaners; use mild alkaline abrasion cleaners.

Smoke, grime and soot of cities when allowed to accumulate can best be removed by sandblasting, though steam cleaning or hand scrubbing will help. A building should always be hosed after cleaning to remove traces of cleaner and dirty water.

Steam Cleaning

Steam cleaning can be an effective method of removing dirt from marble, if done properly. Do not permit the use of acidic preparations often used with steam-cleaning equipment. Paint the stone with slurry of alkaline cleaner and allow to remain a quarter hour or so before directing steam on the area. Always rinse with clear water afterwards to remove traces of the cleaner or loosened dirt.

It is recommended that management supervise sandblast cleaning to make sure that the pressure is kept down to not more than 60 pounds, that the nozzle of the equipment's hose is kept at least 15 inches from the stone; and that iron-free sea sand or fine abrasive is used. Job contracting sometimes means that operators will step up the pressure, use coarse material and will hold the nozzle tight to the stone to gain time and money, with unfortunate results for the marble.

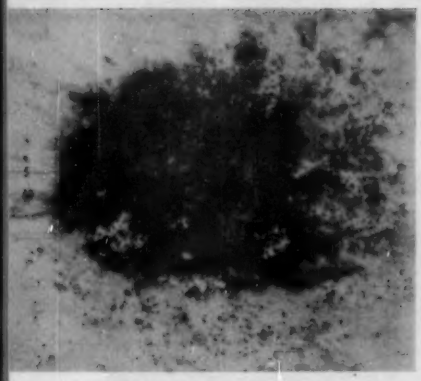
Stones containing lettering or receiving run-offs from above should be scrubbed frequently to remove traces of run-off dirt or rust from signs. Hosing helps to keep upper flat places free of dirt and eliminate such run-offs.

Metal fixtures should be inspected frequently and protectively painted to prevent rust. Bronze and brass should be coated with wax or colorless lacquers to prevent oxidation. The back surface of objects being attached to the marble wall should be painted to prevent oxidation also, before being put up. Water-tight joints between metal and marble should be maintained to prevent dirt from collecting and causing run-off streaks.

Another marble disfigurement that should be watched for is efflores-

To prolong action of stain-remover, men plaster poultice of it on marble walls.

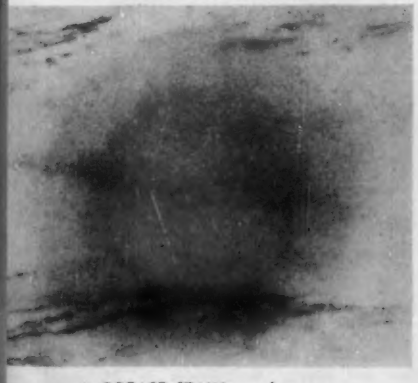
Poultice on interior walls dries in 24 hours, is removed, and may be reapplied.



A RUST STAIN can be . . .

An OIL STAIN can be . . .

An ORGANIC STAIN can be . . .



A GREASE STAIN can be . . .

cence: a deposit of masonry salts on the stone surface usually near joints. The presence of these salts is an indication that water has gotten into the back of the masonry either through open joints or inadequate flashings and has dissolved soluble salts in the masonry. As this solution comes out to the surface from the pulling action of the sun and wind, the water evaporates and deposits the salt which again crystallizes, forming deposits that disfigure the marble and catch dirt readily. If removed in time they can be easily gritted off, but if built up through neglect it may be necessary to sandblast or chisel them free. It is vital to correct the original condition by repointing or reflashing.

Occasionally efflorescence is caused by condensation in unheated and unventilated rooms. Condensation can be prevented by proper heating or by ventilation. Vents can be installed in the walls, windows, or doors to provide an exchange of air.

Repointing and inspection of joints is usually undertaken at the time of cleaning a building, except when the efflorescent condition above is noted.

Interior wall marble should be washed with clean water periodically to remove dust and any oily or smoky deposits from heating plants. Floor marble must be washed frequently, oftentimes daily, depending on the amount of use. This washing procedure applies also to polished marble building-fronts. Decorative dark marbles should have invisible films of lacquer or wax to retain their polish and color.

Use clean water and soft-non-gritty cloths on the wainscoting and base. Chamois can be used to wipe dry, preventing water spots and streaks. On the base it may be necessary to use a soapless, non-abrasive cleaner in the water. Sometimes in corridors where people gather or near elevator lobbies, perspiration stains and dirt from hands will build up on the wall. In this case use a soft cloth dampened with a powerful solvent designed for oil and grease stains, but containing no harmful acids, to clean the area; then, wipe dry and wash the area with water containing a soapless cleaner.

Cleaning Marble Floors

Wet marble floors first with clean water. Prepare a shaker out of an old can with tight cover and fill with a marble detergent. Sprinkle the wet floor very sparingly with the detergent and then mop or scrub. Clean small areas and remove dirtied water as soon as possible and rinse thoroughly, preferably using a different mop for this clean up. If dusting or white streaks appear after the floor is dry then too much detergent has been used or the floor has not been properly rinsed.

Avoid scratching the marble floor with the metal parts of the mop. A wise precaution is to attach bumpers to or wind cloth around the projecting parts.

Stain Removal

Stain removal is almost a separate part of marble cleaning. It uses different compounds than the general cleaning of either outside or interior marble, it must be separately done to a specific area and not simply made part of the general cleaning technique, and most important of all it requires persistent effort.

It is essential to remove a stain from marble as early as possible before it becomes a "permanent fixture." Go about the stain removal systematically by first diagnosing the type of stain, second by removing its source, and third, by applying the correct cleaning materials.

The diagnosis of stains is easier if you can examine the stain closely and find the cause. See whether metal fixtures, bolts or trimming have rusted, whether wood is around a foundation or has been used as a shim in a joint, whether bird droppings, leaves, bud shells from trees, etc., have lodged on projections, or whether oil or grease has gotten on the marble. If no obvious answer is immediately visible, these suggestions may help. Treatments for

stains from these sources are given later.

Oil and grease stains are usually circular spots with the center darkest. If the surrounding stone is wetted this spot becomes lighter than the surrounding area because water will not penetrate it. An oil solvent cleaner should be used.

Organic Stains

An organic stain is caused by wood, bark excelsior, paper, leaves, bugs, seeds, bird droppings, etc., which decay in the presence of moisture. It is well to remember that decaying matter around or in a foundation may go into solution and travel up through a marble wall quite a distance before it shows a stain where the water evaporates. These stains are usually pinkish-brown in color, sometimes in the shape of the article causing the stain, but often covering a larger area. Sidewalks are often subjected to this in the spring from seeds, nut shells, etc., of overhanging trees. These stains, once the source is removed, will in time disappear with sun and rain. To remove them quickly use a bleaching action.

Metallic Stains

Metallic or rust stains are caused by the oxidation of metals and are usually brown or rust-color, although copper and bronze stains are green and lead stains are yellow orange. They take the shape of the article that has oxidized with slight fanning out all around or are streaked in the case of run-offs.

After diagnosis, remove the source, wet the surrounding marble to prevent spread, and apply the treatment that seems to be indicated. Several applications of it may be necessary or possibly a combination of stains may require the use of one treatment followed by another. The bleaching treatment should be last where more than one treatment is necessary.

Sometimes it is necessary to prolong the usefulness of a cleaner over a stained area and this is accomplished with a poultice. Liquid cleaners are poured into a container and whiting, talc, marble dust or a marble detergent is added until a thick paste results. In the case of a powder cleaner these materials are mixed into the poultice material and made into paste consistency with water.

The poultice is applied to the stained area, or over the whole wall in the case of wainscot cleaning, with a wooden paddle or trowel, to a depth of about one-half inch and allowed to slowly dry for varying lengths of time as mentioned in the specific treatments following. It is advisable in general poultice cleaning with a marble detergent to cover the area entirely, retard drying with damp cloths for 24 hours, and then to leave the poultice in place for another 24 hours.

Most poultices should be removed and discarded, except certain detergent poultices which may be used over and over again, and the stone flushed thoroughly with clean water until all the poultice is removed.

For oil and grease stains apply a poultice containing a solvent cleaner over the spot. Leave in place until the poultice is dry. For organic stains chlorine bleaches may be used in poultice form, but hydrogen peroxide is preferred. Secure the hair-bleach variety (17 to 20 percent volume). Pour some into a glass or pure aluminum dish and make a poultice. Quickly pat this on the stained area and add a few drops of household ammonia to the poultice. Use the cap of the bottle or a dropper to avoid adding too much. Use rubber gloves when handling the peroxide. Remove the poultice when the bubbling action stops and flush into ground or sewer to avoid combustion.

On flat stones, liquid peroxide may be poured on the stain area and ammonia added to it without resorting to a poultice. On vertical areas poultices are required.

Use a crystal cleaner which will reduce insoluble colored iron salts to colorless soluble ones to combat iron stains. Superficial rust can

(Continued on page 44)

REMOVED by crystal cleaners

REMOVED by solvent cleaner

REMOVED by hydrogen peroxide bleach

REMOVED by oil solvents and H_2O_2

The Story of

MORE AND MORE industrial plant managers are becoming concerned with the problem of noise. What has focussed attention on this problem in recent years is the rise in compensation claims by employees who have had their hearing impaired by long exposure to the noises of constantly moving machines, such as pneumatic chippers, drop hammers, hydraulic presses, punch presses, printing presses and textile looms. One mid-Western company alone is faced with the possibility of paying out 500 thousand dollars in claims based on workers' loss of hearing. Hundreds of other companies are similarly beset with this recently recognized problem. One industrial observer estimates that claims for loss-of-hearing could reach $2 billions right now; another avers that if these estimated $2 billions were decided in favor of workers, it would give rise to another $14 billions worth of claims from workers—many of them retired—who had not given any thought to it before.

Evidence that industrial racket is a serious problem is the news that a number of state legislatures have or are contemplating bills altering present compensation laws to require payments in cases of hearing loss by employees. New York State's workmen's compensation law, in fact, is rather definite about it—it clearly states that any employee whose hearing has fallen below average as a result of plant noise can claim a compensable loss. The one thing that has prevented a river of claims from inundating New York industrial firms is an administrative ruling which requires the worker to be away from the injurious noise for 6 months before he can receive compensation. Fearful of the potential financial losses involved, a number of New York manufacturing firms have banded together under the aegis of the Associated Industries of New York State, Inc., which is stumping to change the law so that compensation will be paid on the basis of actual wages lost as a result of ear injury.

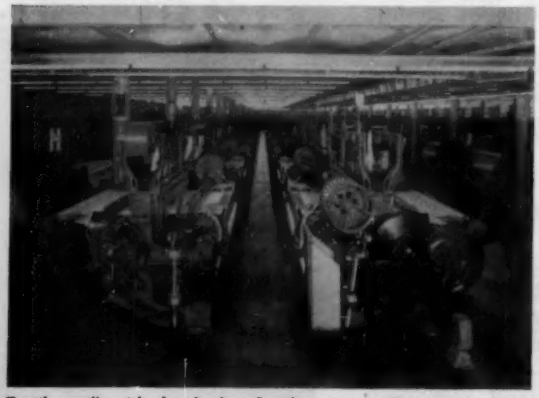
Extra-heavy perforator machines are mounted on felt pads for vibration isolation.

There are a number of tangled skeins snarling up the noise problem, which make the solution difficult. Interpretations differ radically from state to state as to how much compensation should be paid—should it be paid on the basis of the actual wages for time lost due to hearing impairment, or on the basis of a flat settlement for the disability regardless of time lost? There is also confusion as to what actually constitutes hearing loss—should it be total loss, half loss, or partial?

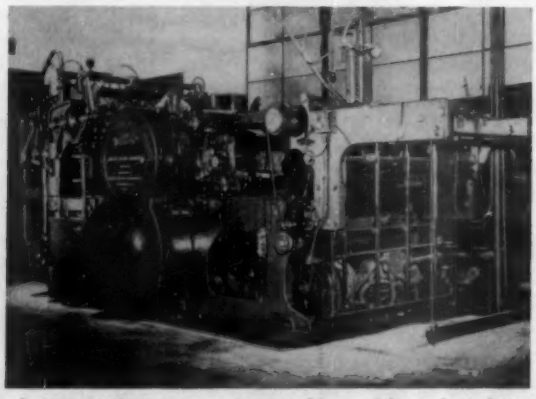
"Average" Hearing Standard

In New York, hearing loss is interpreted as proof that a worker's hearing ability has been lowered from a predetermined "average" level for all workers—but, of course, evidence has to be supplied as to what level of hearing the worker had when he was first hired, or first exposed to noisy machines. Massachusetts recognizes total deafness only, no partial losses, while Wisconsin takes the medium approach. In Wisconsin they consider the fact that the average worker's hearing ability diminishes anyway as he or she grows older, regardless of exposure to noisy machinery—so they have established averages based on ages.

Hearing loss is only one of the problems involved in excess industrial noises. There is a definite safety angle involved, too. Employees who have impaired hearing are



Textile mill with hundreds of vibrating machines uses felt pads cemented to machine feet and floor to check clatter.



Large printing press rests entirely on felt pad, isolating it and keeping its vibrations from spreading to flooring.

Vibration Isolation

by WILLIAM C. KING
Exec. Vice-President
The Felters Company
Boston, Mass.

✓ What it is . . .

✓ How it cuts noise

✓ Methods & Materials

often likely not to hear warning signals, calls by fellow workers, approaching vehicles and noises in a machine which indicate dangerous conditions such as loose shafts or bolts, or broken parts. Excessive industrial noise also fatigues workers. Fatigue leads to loss of concentration, makes employees accident prone, and lowers mental aptitude, thereby reducing output, efficiency and quality of work. Continued exposure to loud noises also irritates workers' nerves, with resultant loss in reflex ability—a dangerous condition in itself. It has even been found to raise workers' blood pressure. Absenteeism and labor turnover are definitely attributable to too much plant noise.

Slight Drop—Big Difference

While they are hasseling with state compensation boards, hundreds of manufacturing firms are doing something concrete to decrease noise. A drop of 5 to 10 decibels in the overall noise of a shop, or of a given work station is very important—it could spell the difference between loss of hearing, and maintaining normal hearing.

Most people speak in a range between 45 and 75 decibels. They can tolerate noises in the 75 d.–100 d. range for reasonable periods without discomfort; when noises rise above 100 decibels, they become nuisances and in the 130 d. range they become positively painful to endure for more than brief periods. Prolonged exposure to noises in the 100 d. and over bracket is bound to impair the hearing ability of workers, and cause other physical conditions mentioned above.

To give an idea of the hearing hazards of some industrial equipment, consider the decibels attained by a few: punch press 100; hydraulic press 110; boiler factory 120; drop hammer 120; pneumatic chipper 130; jet engines 150. There are certain occupations in which there is evidence of noise being detrimental to aural sensitivity. Boilermakers' deafness is quite common, for example; tube train drivers sometimes experience temporary deafness owing to the high level of noise. One source states, "Machinists, blacksmiths, coppersmiths, boilermakers, weavers and workers in trades of similar noise exposures, have all shown a substantial percentage of total and partial deafness, while only a lesser percentage retain their normal hearing."

A Coupled Problem

Coupled with the problem of industrial noise is the vibration of constantly moving power machinery. Plant operators have been much more aware of this problem, and hundreds of plants have been successfully combatting vibration for a couple of decades. In so doing they were abating the noise volume simultaneously. Excessive machine vibration has a safety angle, too, in that it can cause the breakdown of parts of equipment, which may result in bolts, nuts or other parts of machinery breaking loose and injuring workers. But the most serious aspect of excessive machine vibration is the monetary loss to factory owners from shaking high speed mechanisms out of alignment; wear and tear on machinery, floors, walls and windows; damaging delicate parts and slowing production.

One way of attacking the noise problem in industrial plants, is, of course to try to eliminate the source of the noise as much as possible by alterations in gears, moving parts, and surfaces of parts which strike together. Installation of acoustical materials on ceilings and walls is another effective measure.

Similarly, some vibrations can be eliminated through improved design of unbalanced rotating or reciprocating components of a machine, couplings, shafts, etc.—the source of vibrations. But these methods are limited and often impractical, since it is sometimes not feasible to change the physical structure of machinery for fear of affecting the results.

The most common method of cutting down the decibels and dampening vibration is mounting machinery on pads or units designed specifically for this purpose. There are a number of different types of sound reducing and vibration-isolating materials—felt, rubber, cork, wood, paper, composition, plastics and metal springs.

(Continued on the next page)

In selecting the proper material on which to mount power-driven machinery, a plant production manager or maintenance supervisor should consider: Does it (1) support the weight of the machine without deflection; (2) absorb machine vibration without transmitting it to surrounding structures; (3) withstand repeated loading and pressures without setting; (4) resist deterioration from air, water, oil, grease, acids and other substances; (5) maintain its anti-vibration and noise absorption properties for long periods of time; (6) remain easy to apply and remove, if necessary. Cost, obviously, is an important consideration, as well.

Cork for vibration-isolation comes in a board, varying in thickness from 1 to 4 inches; usually in 3-foot lengths; and with 3 ranges of densities: light (700–2000 psf); standard (2900–5000 psf); heavy duty (5000–7200 psf). The boards are easily cut to sizes needed. Cork anti-vibration material is often used in floating and sunken foundations for heavy machinery mounted on concrete bases. The cork board separates the concrete base from the concrete floor slabs, deadening the impact and restraining the vibrations from being transmitted from machine to floor.

In some cases, instead of mounting a battery of machines on such cork pads, the entire floor slab is actually mounted in sheets of cork at the points where it is connected with the building walls. Thus the concrete floor does not touch the walls, and the cumulative vibrations from a number of machines are not transmitted to the wall.

Semi-hard natural or synthetic rubber is also a commonly used anti-vibration and noise-deadening material. It is frequently used, in fact, inside a machine, such as a casing around motor shafts, to reduce vibration at the source. Rubber is also bonded to steel flanges and bolted to the floor in the traditional manner of other vibration-isolation pads.

One special type of vibration pad assembly utilizes a rubber tube through which the floor bolt passes; a rubber pad separating two steel plates, one on the floor, the other under the machine support; and a rubber holed-out disc separating the machine mount from the washer and bolt nut. This has been used effectively for dampening low frequency vibrations, but is not recommended for frequencies from 100 to 650 cps.

In considering the use of rubber, it should be borne in mind that it has a certain amount of expansion from the weight of the load it is carrying, and may be affected by extremes of temperature. Natural rubber pads should be coated with oil-resistant varnish if they are to be exposed to oily atmospheres. Synthetic rubber pads are generally oil resistant.

There are a number of special steel mounts on the market, some involving springs. One steel mount is a self-levelling device in which an isolator resilient material is encased within a steel frame. The machine foot is bolted onto the mount, and by turning the bolts which have locknuts, the machine can be adjusted level. These mounts have the advantage that machines can be quickly moved around with the aid of a fork truck and other transportation devices.

Most Widely Used Material

The most widely used substance for vibration isolation and noise abating is the felt pad under machine mounts. Felt pads are popular for a number of reasons, not the least of which is their economy and ease of installation. Felt pads come in thicknesses ranging from 1-sixteenth inch (for desk machines) to 3 inches; and in varying densities from 10 psi to 250 psi. Felt pads are used for anchoring machines of all types from small lathes to 450-ton hydraulic presses, and may be cemented to floors of every material except asphalt tile. The economy factor is important, for experience with a number of typical installations has shown that labor costs for a typical job are 50 to 75 percent less than in ordinary machine installations. The reduction of installation labor costs alone—particularly in eliminating the need to drill lag bolt holes in machine mounts and in concrete—is an important saving.

Felt pads first came into use as vibration-isolation material about 20 years ago when Lawrence H. Hansel, then general sales manager of The Felters Company of Boston, Mass., got the idea that this was a likely market for his company's heavy pad felts. To back up his theory he employed an independent firm of consulting engineers, to conduct a series of research tests on the reduction of vibration and noise after mounting textile machines on felt pads.

A trio of engineers tested the material first on textile looms and spinning machines. A series of carefully controlled tests revealed that transmitted vibrations were reduced from 50 to 85 percent, with an overall average of nearly 60 percent; and noise volume was decreased an average of 25 percent. Heartened with these results, Mr. Hansel had his company install all their moving equipment at the Millbury, Mass. mill on felt pads, the first installation of its type.*

Since that time more than 750 thousand textile machines alone have been mounted on felt pads. In a typical installation to test the efficiency and economy of felt mountings, 100-W-2 Crompton and Knowles looms were anchored with felt pads and maintenance costs compared over a 4-month period with 80 looms not so mounted. On this basis, the savings in maintenance per loom per year amounted to $15.48. The felt pads cost $8.20 per loom. Thus, in this instance, the pads paid for themselves in about 7 months, with, for all practical purposes, an indestructible life still ahead for them.

The next field the company tackled was printing. The results of a pilot installation were equally as impressive as those in the textile industry. An official of one of the first companies to try felt pads, said, "After mounting our new 12 by 18

Kluge on the pads, only the rhythmic click of the machine was audible. The feeding of folders was expedited through the absorption of jittering of the machine on the concrete floor. The guillotine cutter is easier to operate—and much less noisy."

Five years ago, a large printing firm in Fort Wayne, Indiana, built a new plant with concrete floors and a steel roof to keep pace with rising building costs. Twenty presses and pieces of bindery equipment were mounted on vibration-isolation felt. The engineers reported that the pads changed the noise to a less annoying kind of sound, besides reducing it. Squeaks, groans, sharp clicks and buzzes, all most annoying sounds, were reduced effectively by the felt pads. And where the original level of sound was around 110 db, the new ranges ran from 55 db for the office to a top of 98 with an overall average level in the mid-80's, an improvement of 25 percent.

Since the original print shop installation of felt pads, hundreds now have them under box folding machinery, compressors, cylinder presses, die-cutting machines, die-stamping machines, drills, folding machines, vertical presses, etc.

Use of felt pads to anchor other power-driven machinery spread to scores of other fields. Felt has been successfully used and is being increasingly resorted to for isolating such production equipment as shoe machinery, lathes, grinders, milling and heading machines, drills, marine propulsion diesel engines, air compressors, die-casting machines, forging hammers, pebble mills, washing machines, electric motors, pumps, riveting machines, stokers, and office equipment of all types.

Interesting Applications

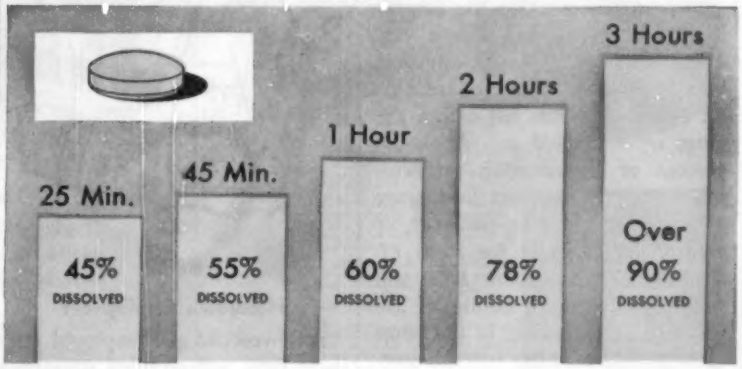
An interesting application of felt pads for office equipment was recently made by a major life insurance company in New England. They had been troubled with top-heavy drawers filled with folders, causing file cabinets to tip over when one or two were pulled out, a serious hazard to employees. They ended this nuisance by cementing the cabinets to felt pads which in turn were cemented to the floor—3 grown men couldn't budge the cabinet by hanging onto the top drawer after the cement had set.

Easy removability is one of the important qualities of felt pads. To move machines already mounted on felt pads, a solvent is applied which loosens the cement. The felt pads can be recemented in the new spot—and they usually outlive the machines.

Felt pads are engineered directly to machines—there is a wide range of felts to accommodate different types and weights of machines. In engineering felt pads to a machine, not only the weight of the machine is considered, but the area of mounting or base, the force of impact, and the vibration frequencies at different points. Rather than mount ma-

Controlled dissolving action is the reason Morton Impregnated Salt Tablets give fast relief—without nausea

This chart shows the controlled dissolving rate of a typical Morton Impregnated Salt Tablet



Within minutes, the average person begins to feel better, work better, when he takes Morton Impregnated Salt Tablets. For as soon as the tablets are taken, essential body salt lost through perspiration begins to be replaced—but at a gradual rate, so as not to cause nausea.

For more than three hours after Morton Impregnated Salt Tablets are taken, they continue to fight heat fatigue by supplying salt. Careful, uniform coating of the salt crystals in each tablet results in controlled dissolving action—the reason Morton Salt Tablets give such excellent results.

Morton Yellow Impregnated Salt Tablets come in a handy, disposable dispenser. Plastic and heavy-duty aluminum dispensers are also available, as are plain salt tablets.

Place your order this week with your local safety equipment distributor. If he cannot supply you, write:

MORTON SALT COMPANY

Dept. SM-8, 120 South LaSalle Street
Chicago 3, Illinois

Complies with Federal Specifications SS-S-31e for Type III, Class C Impregnated Salt Tablets
U. S. Patent No. 2,665,236
Patented 1954 (Canada) No. 501,316

(For details, use Key # H-11 on card on page 71)

chines on felt pads of maximum thickness, experience has shown that best results are obtained with felts of optimum thickness. The greatest isolation efficiency is accomplished by using the smallest practical area of felt that resists the load placed upon it without excessive compression.

Felt pads are cut to the area of the machine footings with a very small overlap. General purpose felts of varying thicknesses are used for machines which fall within the range of 10 to 100 psi. About 80 percent of all vibration problems fall within the medium load range of 10–50 psi. Heavier pad felts, of course, are available for loads exceeding 100 psi—some felts will withstand maximum loading of 250 psi. For light loading, in the range of 10 psi or less, softer felts are used.

Usage Advantages

Long-term tests show that felt will not break down under repeated impact loads; that it is resistant to oil and grease and mild acids; that it will not deteriorate with age; it will not ravel when cut; it will not spread, "give" or set to any degree that would place a machine out of alignment. Its success as an isolator stems from the spring-life and high indestructible character of the wool fiber of which felt is mostly composed. Wool fibers are natural springs, and thus vibration isolation, cushioning and padding are among the natural mechanical functions of wool felt.

It is apparent that diminishing noise is sound business for any manufacturer in the results obtained: improving the morale, energy and effectiveness of workers; not to mention saving compensation payments. And dampening vibration gives a better shake to any business by minimizing wear and tear of machinery, floors, windows and walls. In short, noise reduction and vibration isolation are plus safety factors for just about any type of manufacturer.

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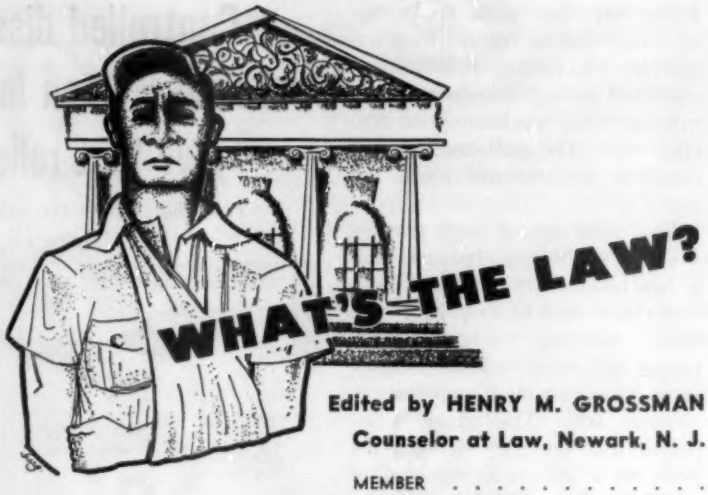
* Further details concerning this product may be obtained on inquiry to the Editor.
Pictures by courtesy of The Felters Company.



Edited by HENRY M. GROSSMAN
Counselor at Law, Newark, N. J.

MEMBER . . . . . .
Master Superior Court, New Jersey
American Bar Ass'n, New Jersey Bar Ass'n,
National Federation Insurance Counsel
Past Commander, American Legion, Post 10,
. . . . . Newark, N. J.

MINOR

Hazardous Employment

A 15-year-old girl employed on a dairy farm was awarded compensation for burns and the loss of a thumb and finger when she fell against a gas heater in a dairy. The Court ruled that employment where power was used was hazardous employment within the meaning of the statute. The court rejected the dairy owner's contention that the dairy operation was incidental to the operation of the farm, and as a farm, the compensation act would not apply.

F. L. MILLWEE DAIRY VS. COFFELT
Oklahoma Supreme Court. No. 36,597.
March 22, 1955.

Many states provide by statute that employers are liable for double compensation, when they employ minors who are under the statutory age for working, when the minors have no working papers, or when they are put to work in what the statute terms "hazardous employment." The fact that the minor may give his employer a false age does not usually constitute a valid defense, so that it becomes mandatory upon any employer hiring a person to require proof of age. Many states, of course, may subject the employer to criminal prosecution for illegal hiring of minors so that there is an additional compelling reason, to an employer, to be sure of a prospective employee's age.

CONTEST WINNER

Course of Employment

The petitioner had journeyed with the manager of his insurance agency to another town to attend a luncheon as a reward for winning an insurance sales contest. The luncheon ended at 2 o'clock and the employee and his superior did not leave the club until about 5 P.M. About 8:30 P.M., the employee was injured in an auto accident on his way home.

The court held that the employee was in the course of his employment in attending the luncheon and allowed him to collect for workmen's compensation benefits. The court reasoned that the employer benefited from the sale of the insurance and the luncheon served as an incentive for the sales. The employee was not compelled to attend the luncheon, but this did not take it outside the course of his employment as the superior position enjoyed by the employer permits him to exercise compulsion indirectly. The fact that the employee was not reimbursed for his expenses in making the trip did not mean that the trip was outside the course of employment.

LAWRENCE VS. INDUSTRIAL COMMISSION
Arizona Supreme Court. No. 5884.
March 8, 1955.

GETS-A-LITE GUARD and GUIDE

Quickly and Easily Installed by Anyone — No Tools Needed!

- Simply slip GETS-A-LITE GUARD AND GUIDE over the fixture, as illustrated.
- Made of indestructible spring steel wire. Nothing to break, get out of order or replace. Will last indefinitely.
- Once installed, GETS-A-LITE GUARD AND GUIDE is NEVER removed.
- Nothing to unlock, fuss with or lock, when changing lamps.
- GETS-A-LITE GUARD AND GUIDE actually steers lamp into socket, enabling maintenance man to change lamp in 10 seconds!
- Available for 40 watt and 100 watt fluorescent lamps.

GETS-A-LITE Company—Dept. SM-85

3865 N. Milwaukee Ave., Chicago 41, Illinois

(For details, use Key # H-15 on card on page 71)

SAFE, EFFICIENT INDUSTRIAL CLEANING COSTS LESS----WITH NEW BENNETT UNIVERSAL AIR-OPERATED CLEANER!

It's easy wherever it's used

The Bennett cleaner is *safe* because it is completely non-electrical. There is no danger from sparking, because there are *no* moving parts.

The Bennett cleaner saves *time and money!* It's light and highly portable. Cleans walls, shelves, beams, storage bins and other out-of-the-way surfaces with a minimum of labor!

Powerful suction developed by compressed air (approximately 90 lbs. pressure) . . . adequate for all industrial applications. Highly efficient WET or DRY pickup.

Adaptable to any industrial application! Picks up metal chips, glass particles, etc. Interchanging bag with hose permits removal of liquids from any normal surface or tank.

Special fittings and brushes make the new Bennett cleaner adaptable to any industrial application. Interchanging bag with hose makes it adaptable for removal of liquids from any normal surface or tank.

NO MOVING PARTS! . . . Unlimited life . . . no danger from sparking.

COMPACT—POWERFUL! Highly efficient WET or DRY pick-up

LIGHT—PORTABLE! Body of aluminum casting.

EASY TO OPERATE! Designed to reduce operator fatigue. Hand-operated metering valve.

COMPLETE UNIT WITH 1" ALUMINUM NOZZLE, AND BAG $29.95

NO ELECTRICAL CONNECTIONS NECESSARY!

M-M-A, Inc., Lancaster, Pa.

(For details, use Key # H-14 on card on page 71)

BAKER'S ASTHMA

Caused by Flour Dust

Claimant's employment as a baker necessitated the inhalation of powder from the flour. This inhalation resulted in the disease known as baker's asthma, or bronchitis. The court, under the New York Workmen's Compensation statute, allowed a compensation award under the provisions of dust diseases.

HENDLER VS. CAYTON BAKERY, INC. (1941) 31 N. Y. S. 2d 299.

Note

It is interesting to note that a New Mexico statute Chapter 29, (S. D. 7) Effective Feb. 19th, 1955, provides that if death or injury to a workman results from the negligence of an employer who failed to supply reasonable safety devices, although the safety devices are not prescribed by law, the compensation payable shall be increased by 50 percent.

Industrial Laboratory Accidents Increasing

A GENERAL INCREASE in research and quality control work in large and small industries has resulted in an "alarming" upturn in the number of laboratory accidents, according to J. O. Bengston, president of the Chicago Apparatus Co.

"Many of these accidents are not the reportable type," Bengston said, "and there is presently no statistical material available for comparative purposes. Our field men have reported, however, that the accident rate is increasing far beyond the rising rate of laboratory activity."

Bengston said the increased number of accidents indicated a lack of cooperation with laboratory and safety directors within individual companies, as well as a failure to develop a proper mental attitude in the laboratory, and failure to make use of available safety devices and safety engineered laboratory tools.

He urged chemists and others engaged in laboratory work in industry to abide by safety rules, and to use apparatus and equipment with safety features.

"There has been a great advance in incorporating reasonable safety features in laboratory items," he said. "Manufacturers have themselves done a great deal of research to make their products safe as well as functional."

Bengston cited such examples as the heating mantle, clamps, safety tongs, glass tubing manipulators, face shields, pipette fillers, goggles, respirators, asbestos and rubber gloves, air stirrers, stopper removers, and bottle and carboy tippers.

Where constant temperature ovens or other equipment falling under Underwriters' Class I, Group D, classification as "Hazardous Locations" are necessary, Bengston said, laboratory directors should consult qualified representatives of laboratory supply houses for recommendations.

B R E C K

FOUR WAYS TO PROTECT SKIN FROM INDUSTRIAL DERMATITIS

BRECK pH7 PROTECTIVE CREAM protects the hands against irritants such as lubricating oils, cutting compounds, tar, greases, rubber dust, aromatic and hydrocarbon solvents, fiberglass, paint and iron dust. It forms a non-sticky, invisible film over the skin. Breck pH7 Protective Cream is easily applied. It is easily removed with Breck Hand Cleaner or soap and water.

BRECK WATER RESISTANT CREAM protects the skin against the action of water and water solutions such as liquid coolants, emulsified cutting oils, mist and spray from alkali baths and plating solutions, cement and lime. It covers the skin with a light, protective film which is not slippery or sticky. Breck Water Resistant Cream has a pH value of 8.

BRECK HAND CLEANER helps eliminate the use of harsh, gritty, highly alkaline or defatting hand cleaners. It does a thorough cleansing job, yet is mild and non-irritating to the skin.

BRECK WORK CREAM is used after exposure to degreasing materials and at the end of a day's work. It substitutes fatty materials for the natural skin oils which have been removed. In this way Breck Work Cream helps keep the hands smooth, pliable and lubricated.

A Breck Industrial Preparations Booklet will be forwarded to you upon request.

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(For details, use Key # H-13 on card on page 71)

industrial hygiene

Industrial Health Conference

THE SECOND ANNUAL Pacific Northwest Industrial Health Conference has been set for September 12 and 13 in Portland, Oregon, according to Attendance Chairman, R. Walter Ager of the Hyster Company. All sessions will be held at the Multnomah Hotel.

Sponsored by the Portland Chamber of Commerce, the first conference, held last year, was attended by some 315 registrants. It is expected that between 400 and 500 persons will register for this year's meeting. A number of nationally recognized industrial health authorities will be featured during the two-day program. Two features of the 1955 meeting will include an industrial health program for the small plant and a report on how the cardiac can work.

Information, program outline and registration blanks for the two-day session can be obtained by writing to: Pacific Northwest Industrial Health Conference, 824 S. W. Fifth Avenue, Portland 4, Oregon.

Cure for the Common Cold

THE PROBLEM OF the common cold, one of man's most troublesome and least understood ills, appears more likely of a solution than at any time in the past," Dr. Thomas Francis, Jr., professor of microbiology at the University of Michigan, told a business and banking executives meeting in reviewing the objectives of the Common Cold Foundation.

"This renewed hope that the common cold can be added to the group of diseases man has conquered or tamed," added Dr. Francis, "stems from the application of the Enders-Weller-Robbins tissue culture technique which apparently is permitting the growing of some of the cold viruses.

"Researchers believe that in the foreseeable future a vaccine against at least one family of cold germs can be perfected. These are the so-called 'APC' (adenoid-pharynegeo-conjunctival) viruses."

The spiraling cost to industry of the common cold was emphasized by Dr. Melvin N. Newquist, Medical Director of the Texas Company, and Chairman of the Medical Advisory Committee of the Common Cold Foundation.

"We medical directors know the common respiratory diseases including the common cold account for approximately 50% of all employee absences. And with the current trend to cut the waiting period for sick benefits down from seven to three to one or no waiting days at all, the common cold is becoming a constantly increasing problem and cost to every employer.

"A second factor in this upward spiral," Dr. Newquist said, "is the increased cost of doing business and the increased cost of living. Probably our greatest loss comes in production, as this applies not only to the worker who is absent, but also to the one who tries to stay on the job, and because of his cold has greatly impaired productivity."

Dr. Newquist urged industry on the basis of the encouraging facts presented by Dr. Francis to support research on the common cold through contributions to the Foundation.

"Previous to the development of this tissue culture technique," he said, "we have felt the problem was so complex that it was almost insoluble. Now we have real reason to hope that at least a part of it can be solved and therefore merits our support."

The immediacy of the need for additional funds to widen the research activities on the common cold at established medical schools was voiced by Mr. John P. Syme, Vice-President and Assistant to the Chairman of the Johns-Manville Corporation, and newly elected President of the Foundation.

"Comparatively little research," said Mr. Syme, "has been done on the common cold. This is, I am told by our Scientific Advisory Committee, because such research in the past has been not only cumbersome, time consuming, and expensive, but, up until the time of the new techniques described today by Dr. Francis, it was also considered practically a dead-end street.

(Continued on page 34)

IF HIS

FOOT TROUBLES ARE a source of industrial accidents often completely overlooked in a plant safety program says E. F. Thomas, assistant manager of industrial relations for Marquardt Aircraft Co. He told a recent session of the Industrial Committee of the California Association of Chiropodists in Los Angeles that, although the company reached the million-hour mark without a lost-time injury last September, much remains to be done in clearing up foot disabilities among employees.

Survey Shows Foot Problems

As a result of a spot survey among 30 employees—15 women from the shop and office and 15 men from the shop—Mrs. Martha Lindsey, company nurse, discovered that 12 of the women had defects of the feet and all of the men suffered from some type of foot disability. Most common defects: overrun heels, athlete's foot, corns, and callus formations. All of these disabilities aggravate the so-called human factor, which is the greatest contributing cause to industrial accidents, Mr. Thomas says.

"Regardless of how proficient a man may be at his job, his safety status suffers if he is having mother-in-law trouble, financial problems, or if his feet hurt. Elements such as these make up the human factor in administering a safety program."

Here's Something You Can Do About It

This is what one safety man, E. F. Thomas, at the Marquardt Aircraft Company, recommends for the aching feet problem . . .

1. Broaden pre-employment physical examinations to include a good look at the prospective employee's feet.
   "This doesn't mean that we would turn down candidates for bad feet. It would mean simply reappraising the individual work situation and advising the candidate to see a foot specialist as soon as possible."
2. Broaden group insurance programs to include medical visits which will allow the employee to receive foot treatment.
3. For larger companies, add a chiropodist to the medical staff; and for smaller companies, insist that the doctor who does the physical examinations call attention to foot troubles and recommend treatment.
4. Plant medical directors should demand proper footgear for employees. A safety shoe program would benefit both employee and company. Get women out of two-inch spike heels and men out of work shoes that should have been thrown away months ago. Here is an opportunity for the plant safety committee to participate in a worthwhile educational program.

Original material courtesy of Marquardt Aircraft Co.

When Mr. Thomas joined Marquardt in March, 1954, he inherited an administrative headache in the safety program and an accident frequency rate of 11.2 for 1953. This compared with an over-all aircraft industry rate of 6.36 for the same year. He also found that the nature of Marquardt's operations made it difficult to plan a safety program. The company is a research and development of ramjet engines, afterburners, and components and accessories for both turbojet and ramjet powered aircraft.

"In the development of these engines and afterburners, we in safety work are very much hampered by the lack of production techniques in the planning of our program," Mr. Thomas explains. "For example, every part is a prototype—every part requires a different setup—all of which makes for a complex situation in trying to establish a safety program."

Reorganization—First Step

He tackled his new assignment by reorganizing the former 22-man safety committee, which he felt was too large to be functional. A new committee of 12 was established with 6 permanent and 6 rotating members (2 replacements every 4 months with these replacements to be named by the retiring members).

Committee members were identified by a special plant badge and subcommittees were formed to investigate each accident and near accident, calling on different members of the group each time. As added incentives, Mr. Thomas brought in outside speakers to keynote safety meetings and publicized the committee's activities in the plant newspaper.

Results from the rejuvenated safety program began to show up in April and since that time Marquardt has not recorded a single lost-time accident. Frequency rate for the first 9 months of 1954 dropped to 5.2, an 86 percent improvement over 1953.

The Human Factor Studied

With the details of the safety program ironed out, Mr. Thomas then undertook continuing studies of the human factor as it relates to industrial accidents.

Safety Suffers
FEET HURT

FIRST AID & HYGIENE SERIES
more articles in September and October

"A man brings his wife to work with him—he also brings his family, his financial worries, the state of his digestive system, the hangover acquired from last night's celebration, his fears, neuroses, his daydreams and his anticipated pleasures. He brings to work with him the pressure of his community, any social aspirations his family may have, the problems of his church, his lodge or his other associations, the triumphs or defeats of his golf, his bowling or his other recreations. Accidents today seem increasingly to be due to the so-called human factor.

Foot Problem Constantly Present

"The feet are with us all the time. They are an extremely important part of the anatomy, yet they have not received the attention they so richly deserve," Mr. Thomas explains. "It figures that the so-called human factor could be affected by bad or aching feet."

As a result of data compiled from the survey of 30 Marquardt employees, Mr. Thomas found that among the women calluses were responsible for most defects. A total of 93 percent had run over heels and 26 percent complained of low chronic backaches.

Among female subjects surveyed, one made 16 visits to the first aid room in a period of 20 months and another made 10 visits in 23 months. The visits were not necessarily related to foot troubles.

Of the 15 male subjects surveyed, all had run over heels, 80 percent had calluses and 73 percent suffered from athletes foot. Four complained of back trouble.

Many Visits to First Aid Room

Eighty percent of the men surveyed for foot difficulties had made visits to the first aid room for complaints and/or injuries of one kind or another. One case had made 48 visits in 11 months, another 54 visits in 19 months and a third 53 visits in 22 months. In one case, the subject had made 10 visits in 32 months, 2 of which required medical treatment. In both instances the man was injured in falls from a ladder. His ladder climbing assignments have ended.

Mr. Thomas maintains that these statistics are indicative of the elements that go to make up the human factor in accident studies.

Not Accident Prone—Simply Human

"Was it the mother-in-law, a hangover, a bad golf game or a foot problem that caused the one statistic to visit our first aid room 54 times in 19 months of employment? This is 3 injuries per month for the past 19 months. Five years ago most safety engineers would have said this man was accident-prone. This term is on its way out because it has been hard for all of us to believe that a man could have so many injuries without learning and benefiting and thereafter preventing recurrences.

"Then it must be the so-called human factor—and after seeing this individual's feet, I would be willing to bet that in this case, the so-called human factor was his feet. To begin with, his shoes were old, worn out, and should have been tossed in the ashcan months ago. He had holes in his socks, large overgrown calluses on the bottoms of both feet, corns on both little toes, athletes foot and ingrown toenails on both great toes." The man has been sent to a chiropodist for treatment.

Picture by courtesy of Western Electric Company.
Textual material from Marquardt Aircraft Co.

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Six Models—With or Without Tank

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In 6, 10 & 40 Gal. Cap.

Thorough scrubbing with Hild floor machines should take no longer than once-over-lightly wet mopping. And floors cleaned the Hild way look cleaner, are cleaner, stay cleaner longer, and cut overall cleaning time. What's more, floor maintenance with Hild machines is as much as 10 times faster than hand scrubbing, and more thorough because dirt and moisture are vacuumed out of cracks, crevices and porous floors. It's easy to see why Hild equipment will pay for itself in no time. Hild machines—proved in use for 27 years—are designed for easy and safe operation, and are built with the finest materials and workmanship to provide long, trouble-free service. Hild's versatile vacuums, used as partners to Hild Scrubber-Polishers, perform numerous clean-up jobs, from drying scrubbed floors to vacuum 'sweeping' high-up shelves. Frequent vacuuming of walls, ceilings, shelves, venetian blinds, draperies, carpeting, furniture and equipment, prevents dirt accumulation and caking, reducing need for frequent washing, scrubbing and painting. From every standpoint—economy, efficiency, safety, sanitation, building appearance and employee morale—HILD Maintenance is better maintenance.

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(For details, use Key # H-12 on card on page 71)

Cure for Common Cold

(Continued from page 31)

"An even greater deterrent to getting qualified scientists to tackle this problem was lack of financial support. Because the cold is not a killer or crippler, it has not received the attention or support given the more dramatic diseases.

"Medical schools today are quickly recognizing the significance the new techniques have for attacking not only the problem of the common cold but also the entire range of viruses, and they are increasing research facilities and placing additional emphasis on this type of research. This means outstanding virologists are now ready to attack the problem if adequate support is forthcoming."

Mr. Syme also emphasized that research on the common cold was one activity a company could justifiably support as any progress would help in reducing employee absenteeism and thus result in direct savings.

"This is one of the primary reasons," said Mr. Syme, "why the Directors of the Foundation decided to appeal directly to industry. A second and equally important fact is that by eliminating expensive fund-raising costs the money contributed can go more directly to the purposes for which it was intended."

Air Pollution Counter

EXTENSIVE USE of an electronic instrument which measures and counts microscopic airborne particles, ranging from radioactive particles to germs, was forecast by one of its developers at the third annual National Air Pollution Symposium. Operation of the aerosoloscope was described by Morris A. Fisher, supervisor of fine particles research at Armour Research Foundation of Illinois Institute of Technology, Chicago.

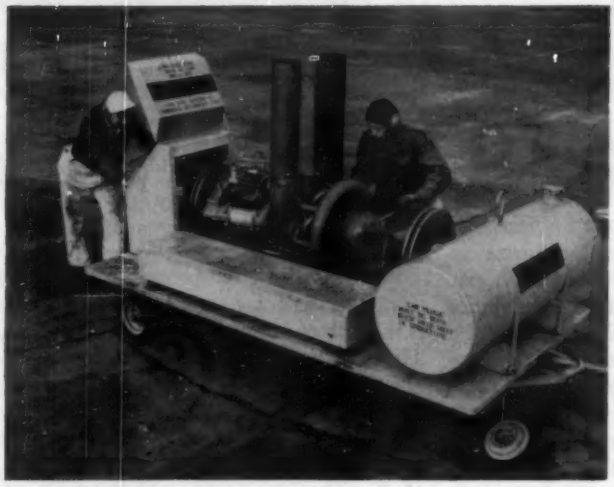
The instrument, developed by the Foundation for the Army Chemical Corps, is capable of measuring and counting airborne particles at the rate of 100 per second —1,000 times faster than by conventional methods. It will enable scientists to analyze airborne particles, such as dust, smog, moisture, and pollen, in cities, factories, and in other places concerned with particle size or contaminant control.

Fisher said the instrument can be used to count and measure airborne particles ranging in size from 1 to 64 microns (a micron is forty-millionths of an inch) in diameter. The aerosoloscope employs as its basic principle of operation the interaction between very small particles of matter and light, known as scattering.

Since large particles scatter more light than small ones, the photomultiplier tube, in connection with other electronic apparatus, can determine the size of each particle. Electrical impulses created by the photomultiplier tube when it detects the scattered light are transmitted to a set of 12 dials.

The first dial records the number of particles 1 to 1.4 microns in diameter. Each succeeding dial records slightly larger particles than the preceding one.

Personal Noise Protection in the Aircraft Industry



Men operating an engine for jet power tests are protected by muffs, ear plugs and by lead muffs in the cloth helmet.

by **SHERMAN M. WILLIAMSON, M.D.**
Assistant Medical Director
Boeing Airplane Company,
Seattle, Washington

IT IS THE RESPONSIBILITY of the industrial physician to protect the individual employee from hearing loss that is the result of exposure to industrial noise. In order to protect the employee from noises, he must evaluate his plant to see if a noise problem exists. He must make himself aware of the type of noise. Is it a constant rumbling of general factory noise or are there sharp peaks of loud noise? Is the loud noise continuous or is it interrupted? Are there sudden impacts that cause the noise? Of what intensity is the noise?

The part that the acoustical engineer can play in noise evaluation is very important. He can determine the noise level and the type of noise in areas that the industrial physician feels are critical. If the survey shows that certain areas or individual operations are in a high noise level category, then means must be found either to reduce the noise level or protect the workers. The engineer must determine if it is feasible to treat acoustically any area. He must also determine if it would be possible to treat a noisy machine to decrease the noise at its source. Acoustic treatment may solve the noise problem. If not, the industrial physician then must advise on the type of personal protective equipment to be used.

In the aircraft industry it is often impossible to screen the noise at the source; therefore, some means must be found to protect the individual worker. Basically, a personal protective device must give attenuation to the point where the noise (sound pressure level) does not cause damage. This protection must be for both high and low frequencies. In our experience there are 3 main groups for whom personal protection is required in the aircraft industry:

a. those in the riveting and production areas; b. those in the hammer shops; c. those working with jet engines. There are other smaller groups in experimental work as in the wind tunnel and the armament section that have noise exposure.

Riveting and Production (includes saw operators, spindel shapers, etc.). The noise in such areas may be of a fairly constant nature, with peaks in the immediate vicinity of an operator. Not only the riveter himself but the buckers and mechanics working in the same area are exposed. Ear plugs offer adequate protection in these areas if they are worn, but the average worker will not wear the ear plugs continuously unless he is forced to do so. Ear plugs must be fitted to the individual if protection is to be effective.

Hammer Shops. Noise for a hammer operator is greatest at the time of impact of the hammer, but with a large battery of these machines, the over-all noise level is rather constant. In general, the old time hammer operator may consider it a badge of his trade to be somewhat hard of hearing, so will not wear any protective devices except under protest.

Jet Engines. This is the area of the highest noise (sound pressure) levels and where no acceptable protective device is available. All available commercial types have been tested but do not protect adequately

against jet noise at full power. The sound pressure level about the J57 jet engine is 130–140 decibels at 100 percent power. With afterburner attached to the J57, levels of 160 decibels are recorded. All protective devices whether plugs, muffs, etc. give a rather good degree of attenuation for the high frequencies. With earplugs plus helmet-muff (the best practical protection yet available), hearing loss may still occur in some persons exposed to 130 to 140 decibels.

Selection of the type of personal protective device must be based on the type of noise exposure. Educating the worker to the use of protective devices is the first step in a plant program. The foreman must be educated first; it is obvious that a program will fail if a foreman tells his subordinates he has been in noise for years and still hears well. The average employee will not wear ear plugs unless he is forced to do so. Busy foremen cannot be expected to patrol noisy areas looking in ears for an earplug that is almost invisible. The physician can't be too enthusiastic about enforcing the constant wearing of a device which can be uncomfortable or painful.

Within our company a noise abatement committee has been appointed to study the noise problem and to make recommendations to management. Physicians are committee members. One of the functions of the committee is the study of the community noise problem. A curfew on the hours of engine runs has been a temporary solution.

Studies at Boeing Aircraft have led to the following recommendations for protecting the worker against hearing loss:

a) Limit the noise exposure time of flight mechanics working on jet engines.
b) Reduce engine-run time to a minimum. By studying engine-run requirements, our experience indicates that exposure time can be cut significantly.
c) Rotate the flight mechanics so that exposure to jet noise is not confined to a few workers. This allows more time for the ears to recover from a single noise exposure.
d) Limit the number of mechanics that are actually required to conduct the tests by (1) use of portable sound attenuation booths for observers and fire-bottle handlers, by (2) development of remote-control engine-trim devices.

Let us consider the personal protective device itself. The most discouraging factor in protection against noise is the lack of acceptable protective devices.

The Earplug. An earplug should be smooth, have no abrasive action on the external canal, be non-sensitizing, lend itself to easy cleaning and be as comfortable as possible. They must be fitted to the individual by a trained technician.

Muffs. They should fit snugly to the head and be free of projections which can catch on machinery and structures. They must clean easily and not cause undue pressure symptoms or perspiration at contact points.

Helmets. The firm type of helmet (similar to a football or crash helmet) is rather cumbersome, expensive, warm and hard to get on and off. The helmets do reduce the sound energy transmitted to the bones of the head. The face should be covered if the helmet is to give maximum effectiveness. There are also the soft cloth helmets, containing various types of muffs, that are more comfortable and do an adequate job of attenuation if noise levels are moderate.

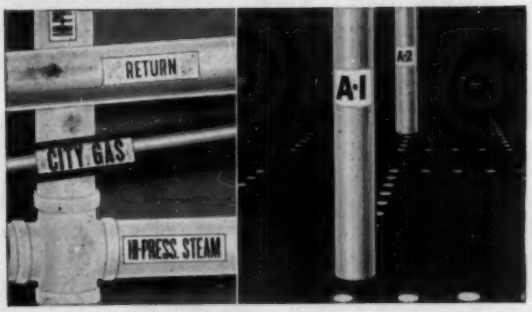
The combination of earplugs and a helmet give more protection than either alone, and must be used to protect against intimate exposure to jet noise.

After the industrial physician has determined the need for noise protection and set up a personal protective program, then he must discover whether or not the adopted measures are effective. By audiometric findings, he will be able to determine the efficiency of the protective devices. It is necessary that audiograms be performed prior to initial noise exposure and then repeated at intervals determined by the findings and the level of the noise exposure. Remember always that one must evaluate any hearing loss by taking into consideration the history and previous noise exposure of each person in a noisy area. Don't blame the hearing loss of the ex-artillery man on the noise in your plant.

Careful pre-employment and periodic audiograms will soon detect progressive hearing loss and thereby assist in revealing the effectiveness of your protective devices. The audiograms will reveal whether or not earplugs are being worn even in more moderate noise level areas.

By courtesy of American Association of Industrial Nurses "Journal." Picture by courtesy of Boeing Airplane Co.

Self-Sticking Markers Cut Maintenance Time and Costs



Self-Sticking Markers which cut maintenance time and costs are available from the W. H. Brady Co., Milwaukee. One of their widely-used products, ALL-TEMPERATURE PIPE MARKERS, stick permanently to pipes as hot as 300°F. Millions of them in use in plants of all types today. They conform to ASA standards and give you a fool-proof, cost-cutting method of pipe identification. Write for Bulletin No. 135-B.

Brady Self-Sticking DOTTED LINE AISLE MARKERS offer a fast, low-cost way to mark aisles. They are so tough they outwear painted lines 5 to 1. Miles and miles of aisles are marked with these markers in plants everywhere. Write for Bulletin No. 141.

A quick, economical method for marking areas, bays, posts, bins, pallets, etc., is found in Brady Self-Sticking All-Purpose NUMBERS and LETTERS. These individual NUMBERS and LETTERS let you make up any combination of markings right on the spot. Stocked in six sizes, these handy Markers fit many plantwide Marking needs perfectly. Write for Bulletin No. 165.

Manufacturer: W. H. Brady Co., 741 W. Glendale, Milwaukee 12, Wis. (For details, use Key # H-16 on card on page 71)

Temporary Disabilities

Part II

by **ESTHER F. RAMSEY, R.N.**, Industrial Nurse
Sinclair Refining Co., East Chicago, Ind.

The Industrial Nurse

We are coming to the belief that there is a dual advantage to industry and to the employee in a program for home contact with the medical absentee. We feel that this program should definitely be administered by the medical department with trained personnel making the contact.

1. It gives the patient possible additional advice regarding his condition.
2. If properly handled by an individual really interested in this type work, it promotes a far better relationship between employer and employee.
3. It promotes an even greater opportunity for case finding.
4. It points up frequency and severity of medical absences of various employees.
5. It prevents exploitation of the sick plan.

There are some industries whose administrative policies recognize the advantage of a home visit program but do not understand that the program can be far more saitsfactory and profitable if the visits are made by a nurse. Certainly the patient feels more secure and less as though he were being pursued by the truant officer when a nurse comes to visit during his illness, rather than some member of the organization who has no medical knowledge.

True, such a visitor can ascertain that the patient is at home and definitely under medical care, but there is a feeling of resentment and antagonism which can develop from a visit by non-medical personnel.

A nurse, on the other hand cannot only ascertain the facts of true medical disability but can actually assist the patient by advice for simple treatment, checking such symptoms as temperature elevation, etc. She can use the facilities of local agencies such as Public Health and Red Cross to the advantage of the patient. She can establish contact with the patient's physician which is most helpful in the treatment and rehabilitation of the employee suffering from a long debilitating disease.

Case Load and Amount of Nursing

If a nurse is working with a well functioning Medical Home Visit Service, she should check the service from time to time for case load. We might well establish what is considered a satisfactory case load for a visiting nurse and what her territory should comprise.

Further in evaluating a Home Visit Program we should establish rather definitely the extent of nursing to be done by the visiting nurse at the time of her visit. In the case of acute emergency there is no question that we would certainly extend our services beyond the call of duty—but for the most part such simple nursing services as are expedient for good service to the patient are all that should be necessary.

Absentee Records: What of our absentee records? Do we keep a systematic, permanent account of every medical absence of every employee?

Even in the face of the fact that the book work and record keeping are becoming quite burdensome to the administration of the department, the service will only be as good as its records. It is only through these records that we can promote coordination between the medical service and the other industrial relations services. The personnel of the services will not necessarily see the patient, particularly while he is ill. But if we can provide some information from our complete records of the case, the outcome should be profitable to interdepartmental relationship. The employment and placement service, the safety department and the supervision and training departments may call from time to time for information regarding employees.

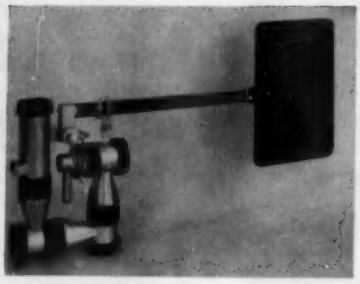
Further, along the lines of record keeping we should endeavor to make a survey of medical absenteeism in the plant. We might consider a breakdown of the types of disease or frequency by department—or similar checks on a monthly or annual basis.

The problem is probably not one of willingness to provide the various services to the organization, but one of convincing the organization that the service is worthwhile. Advancing and promoting the medical service may mean that we must settle to reorganizing the entire program as it now exists.

It probably will mean that we must convince management that such a program will require increase in personnel or even enlargement of the quarters. Here we become salesmen for better medical service. Try to take the time to prepare an evaluation of your present contribution and the benefits of the additional service you are recommending. We can only give the service we are permitted to give so let us continue our constant endeavor to improve this service from day to day by including such programs as the control of temporary disability in the plant.

From an address presented at the 40th National Safety Congress.

KEEPING UP WITH...



AIR-BORNE DUST SAMPLER

AN AIR sampling device for the discriminatory collection of large as well as small air-borne particles, either liquid or solid, is available from Mine Safety Appliances Co. The "Cascade Impactor" employs low air velocities to enable the larger particles to be correctly sampled. Four jets are arranged in series, each with an orifice smaller than the preceding one. The air velocity therefore increases from jet to jet and the efficiency of collection increases from slide to slide.

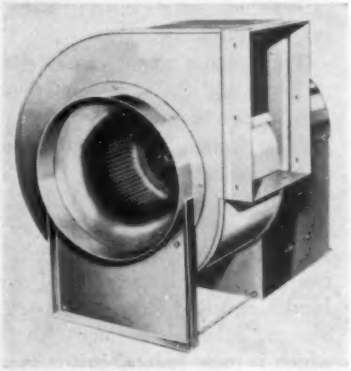
The four microscope slides on which the particles are impacted can be coated with a suitable collecting medium according to the type of aersol sampled. The four-chamber design provides size grading which assists in assessments of the sample. The four stages are demountable for easy cleaning and also for separate use if desired.

For details, use Key # DF-1 on Inquiry Card on page 71.

PAINT SPRAY FILTERS

TO REDUCE fire hazards and to simplify and cut the maintenance costs of paint spray booths and exhaust systems, Research Products Corp. has developed filtering panels that collect paint overspray and prevent paint build-up in the exhaust system. Called "Paint Arrestors," the equipment consists of a bank of frames for holding the filter panels. The frames are installed ahead of the exhaust fan in either booths or down-draft exhaust systems. The 20x20x1 inch filter panels can be replaced when the amount of paint overspray lowers the air flow. They are currently in use in systems ranging from 300 to 112,000 cfm capacity.

For details, use Key # DF-2 on Inquiry Card on page 71.



EXHAUST FAN LINE

A NEW, complete line of utility fans, announced by The Trane Company, has high NAFM certified ratings over its entire range of sizes, following a three-year research and testing program. The completely assembled ready-to-install fan units are available with either direct drive or belt drive, and either forward-curved or backwardly-inclined blades. They include all standard

DUST & FUME CONTROL SERIES
other articles in June and July

Dust & Fume Control

NAFM sizes between 4½" and 30" wheel diameter; capacities up to 15,450 CFM and static pressures up to two inches of water are available.

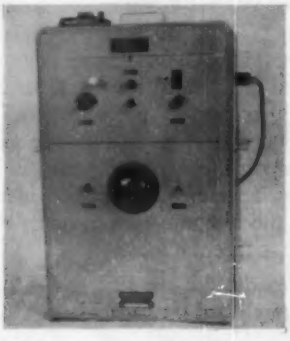
Other features are low outlet velocity, low noise level, versatility, low maintenance, lockseam housing, and overhanging sheave adjustable drives. This last feature permits fan belts to be replaced without disassembly, reassembly and realignment of the fan.

For special applications, these fans are available in special metals, in spark-resistant construction, and with special coatings and finishes. Requiring only electrical and duct connections, these units are suitable for exhausting air from fume hoods, pickling and electro-plating tanks, oven rooms, inside offices, lavatories, kitchens, locker rooms, etc.

For details, use Key # DF-3 on Inquiry Card on page 71.

SENSITIVE GAS DETECTOR

ACCURATE DETECTION of toxic or combustible gases in extremely low concentrations is claimed for the "Supersensitive Gas Detector" by Taller & Cooper, Inc. Capable of indicating gas concentrations as low as five parts per billion, the unit uses the principle of detection of mercury vapor in ultra-violet light. It can be used for laboratory analysis or continuous monitoring of industrial areas.

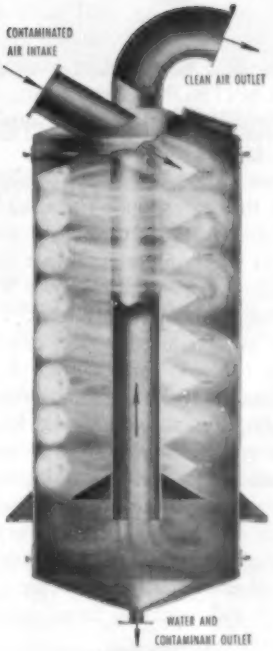


The upper portion of the equipment is detachable and can be used as a mercury vapor detector and for quantitative measurement of ultra-violet absorbing materials such as benzene, toluene, ethanol, methanol, gasoline, aromatic hydrocarbons, alcohols, or water vapor. The complete instrument provides sensitive quantitative detection of reducing or combustible materials such as carbon monoxide, hydrogen, ethylene, acetylene, formaldehyde, hydrogen, sulfide, acrolein, saturated hydrocarbons, lower aldehydes, methane, ethane, propane, water vapor, or oxygen in inert gas.

For details, use Key # DF-4 on Inquiry Card on page 71.

FOG FILTER

A HIGH pressure fog method of dust and fume collection has been developed by The R. C. Mahon Co. as a new tool for both internal and external air pollution problems. It is specifically designed for contaminants of less than 10 microns; and is also capable of handling high temperature fumes without fire or explosion hazard. The filtering fog is released through spray nozzles at 300 to 500 lbs. pressure. Less water is required than in low pressure scrubbing towers, and the fog is also able to effect a certain amount of deodorization.



FOG-FILTER

Capable of handling high temperature fumes. Noncorrosive materials are employed in manufacture when active corrosive gases or fumes are dealt with.

As shown in the picture, the contaminated air enters the collector through the inlet at the upper left. Fog nozzles arranged around the outside of the container and set at a slight angle force the air to spiral downward. The water and contaminants are drained out at the bottom, while the cleaned air rises through the center duct and the curved outlet at the top.

For details, use Key # DF-5 on Inquiry Card on page 71.

COMPACT ELECTRONIC AIR CLEANERS

RECOGNIZING that clean air requirements are just as stringent for small spaces as for steel mills and large buildings, Westinghouse has produced a new line of packaged PRECIPITRON Electronic Air Cleaners specifically for the smaller jobs.

Known as Precipitron cabinet units, they incorporate the same dependable features previously available in larger, more expensive sizes. Air cleaning efficiency is over 90% by recognized soilability tests. Features are: reduced space requirements (only 38" in direction of airflow) and the latest improvements to simplify maintenance. Units come equipped with built-in movable nozzle systems for washing away dirt accumulations and spraying soluble dust-holding adhesive on the working elements. Both washing and adhesive spraying cycles are controlled and operated from outside the unit.

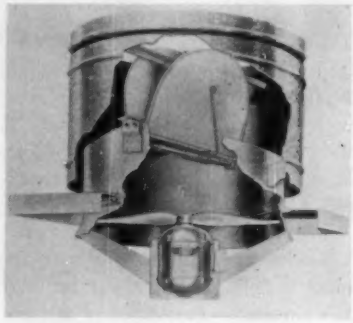
Built in sizes from 200 to 10640 cfm, these units are for use with air handling and self-contained air conditioning units. They are particularly suited for offices, laboratories, hospitals, precision assembly rooms and similar applications where the need for the cleanest possible air is paramount. They are equally applicable to industrial process requirements.

For details, use Key # DF-6 on Inquiry Card on page 71.

EMERGENCY DAMPER OPENER

A NEW thermally actuated, emergency damper opener for its Sky-Blast power roof ventilators has been introduced by the Propellair Div., Robbins & Myers, Inc. The unit allows the roof ventilator to serve as a venting device for smoke, heat and fumes in the event of fire.

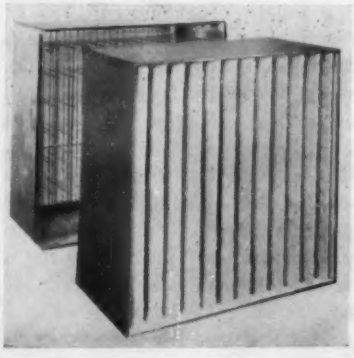
Consisting of twin high-torsion alloy steel springs mounted on a telescoping steel tube support, the device is completely independent of electrical equipment which might be damaged by fire or water. The two steel spring arms are held in place by a fusible link which breaks when the pre-selected critical temperature is reached. These arms immediately open the dampers and function independently of fan operation. Available in two sizes for roof ventilators from 24 to 60 inches in diameter and in a wide range of temperature ratings. The device can be installed on roof ventilators already in service.



For details, use Key # DF-7 on Inquiry Card on page 71.

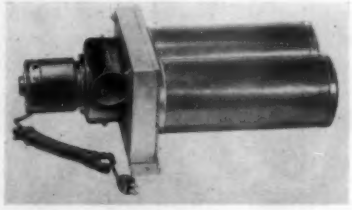
AIR CLEANING FILTER

A NEW FILTER designed to provide high efficiency filtering with a low pressure drop for commercial and industrial ventilating and air conditioning systems has been announced by Cambridge Filter Corp. The new Aerosolve Filter was developed for application in chemical, pharmaceutical, food processing, optical, photographic, electronic, metal working and other industries where clean air is essential, and in situations where a high percentage of dusts or fumes must be kept from escaping.



The new device consists of a permanent, cadmium-plated steel frame, which contains a completely assembled, easily replaceable filter cartridge. Three interchangeable cartridges are available, providing efficiencies of 95, 85, or 35 percent. No maintenance is required except infrequent cartridge replacement by simply removing a specially designed, quick-acting fastener at each corner. They utilize special glass fiber mats whose deep-pleated design provides a large filtering area. The new filter is fire resistant and extremely flexible in it application. Overall dimensions of the frame for the standard 1,000 cfm filter are 24 by 12 inches. Smaller capacities down to 125 cfm also available.

For details, use Key # DF-8 on Inquiry Card on page 71.



GAS & VAPOR SAMPLER

A PORTABLE air sampler, suitable for air pollution tests, is available from W. B. Connor Engineering Corp. The small unit, which is 18 inches long, circulates air through a bed of activated carbon at the rate of 50 cubic feet per minute. The carbon extracts and holds any gases or vapors the air may contain. Laboratory analysis of the carbon identifies the airborne contaminants and their concentrations.

For details, use Key # DF-9 on Inquiry Card on page 71.

AIR LINE HAND VACUUM

IT'S NOW POSSIBLE to convert any air line into a powerful vacuum cleaner for either wet or dry pick-up with the Bennett Industrial Air-Operated Cleaner, available from M-M-A, Inc.

The unit picks up the particles of lint, waste, hair, filings, lathe cuttings, etc. and deposits them into an easily emptied container. Or, it can be connected to larger waste collecting installations, drums, etc. It can also be used for wet pick-up and will empty a 50-gallon drum of water in about 60 seconds.

The absence of electrical parts and its non-ferrous construction eliminate the chance of sparks and the danger of fire in operations where combustibles are handled. A convenient standard valve arrangement with trigger can be used as wanted, or the unit can be set to produce a steady vacuum for installations on grinders, belt sanders, etc. Weighing less than 1½ pounds, it is easy to handle and has no moving parts.

For details, use Key # DF-10 on Inquiry Card on page 71.

HEAVY-DUTY DUST CLEANER

A PORTABLE vacuum cleaning unit for heavy-duty industrial operation is available from U. S. Hoffman Machinery Corp. The HOFFCO-VAC No. 35 is especially designed for continuous work in areas with heavy

What a big difference in *comfort* the HINGED BRIDGE makes!

Your workers will say they never had comfort like they get in the new Willson Contour-Spec—and its new hinged bridge adds an extra measure of protection, too!

It's the *hinge* that permits equal pressure at every point of contact with the face . . . snug comfort regardless of facial contour! And it's the hinged bridge that means extra safety because there are no dangerous gaps around the eyes.

Contour-Specs conform to *any* face—heavy, lean, round, long or bony! Result is, a new concept of comfort combined with protection that encourages workers to wear them willingly.

Let them try Contour-Specs—see how well the 47-mm. lenses suit every eye size—feel how easily the lightweight, snug-fitting Butyrate plastic frame "sits" without pressure anywhere. Order a supply from your Willson distributor now.

NEW *Contour-Spec*®

SAFETY SPECTACLES BY . . .

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More than 300 Safety Products Carry This Famous Trademark

WILLSON®

Leaders in Research and Development of Safety Equipment Since 1870

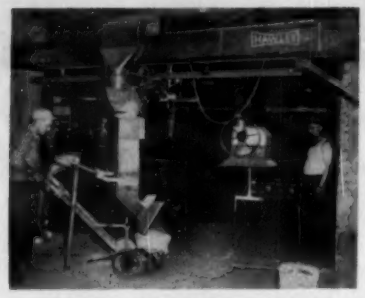
207 WASHINGTON ST., READING, PA.

(For details, use Key # H-17 on card on page 71)

dust deposits. The powerful vacuum provides a suction of 6.5" of mercury to operate through a single 1½" hose of from 25 to 75 feet in length, or two hoses 50 feet long.

The unit is so maneuverable that it can turn on its own length. It has rubber tires, roller bearing wheels, a castered dust container, nine tubular dust filtering bags, tool box, hose rack and electric cord saddle. The multi-stage exhauster is powered by a 5 HP motor.

For details, use Key # DF-11 on Inquiry Card on page 71.



FUME CONTROL SYSTEM

A PATENTED fume control system for toxic, as well as non-toxic fumes, has been developed by Martin Equipment Co. Originally designed for ventilating in non-ferrous foundries, the system is applicable to other foundries and to other industries with dust and fume problems.

The "Hawley System" consists of a cylindrical or rectangular sheet metal hood suspended from a non-flammable flexible duct. The height of the hood is adjusted so that it is directly above the ladle or crucible being used to pour molten metal into molds along a pouring line, or directly above other process or work giving off fumes.

The flexible duct is suspended from a mobile transition box which runs on a track mounted on top of an exhaust duct. Fumes drawn into system enter exhaust duct at whatever point mobile transition box happens to be at the moment. The system is said to reduce health hazards and to reduce plant heat loss in cold seasons, since it operates with only 2500 c.f.m. of air.

For details, use Key # DF-12 on Inquiry Card on page 71.

PORTABLE DUST IMPINGER

A HAND-OPERATED portable dust impinger that is light in weight and compact is available from Mine Safety Appliances Co. The unit samples at the rate of one-tenth of a cubic foot per minute by means a hand pump with a vacuum regulator to maintain a steady flow.

The portable "Midget Impinger," which includes nine calibrated glass sampling tubes, permits dust sampling or surveys in isolated areas, confined spaces, or locations that lack electricity or compressed air. Available also with all-glass impinger flasks with nozzle or fritted glass bubbler for the sampling of many gases and vapors as well as dusts.

For details, use Key # DF-13 on Inquiry Card on page 71.

HAZARDOUS LOCATION VACUUMS

TWO NEW and lower cost commercial vacuum cleaners, one portable (Model P-118) and one stationary (Model SB-118), have been announced by The Spencer Turbine Co. Both are applicable for use in hazardous locations as they are available at slight extra cost with a ⅞ H.P. explosion-proof motor. Model SB-118, for example, offers to such locations as a grain elevator, or when fumes are a hazard, a safe stationary vacuum cleaning system whose explosion-proof motor includes an enclosed switch and is Underwriters approved for hazards in Class I Group D or Class II Groups E, F and G.

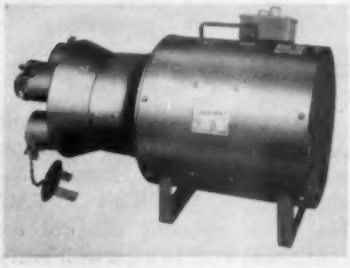
With Model P-118, the dirt can is easily removable with a handy foot release. It also features an enclosed dirt bag which is shaken out *inside the machine*, completely eliminating the spreading of dust and germs. The portable unit has ball bearing equipped rubber-tired wheels for smooth and silent movement and carefully engineered spacing of the wheels and back caster for maximum stability. It may be used for wet or dry pick-up, and where large quantities of water are to be collected, a separate galvanized wet tank is available.

For details, use Key # DF-14 on Inquiry Card on page 71.

MULTIPLE BLOWER

A NEWLY designed blower wheel, powered by a heavy duty ¾ h.p. totally enclosed ball-bearing motor, makes the Chelsea Type OPJ 'Octopus Junior' exhauster and blower a flexible and powerful unit to control dust, fumes, smoke and gas in a wide variety of industrial plant operations.

Ventilation for one or several remote or confined spaces is provided by this portable unit that can be placed or hung in any convenient location between the working area and fresh air, then connected with flexible hose to areas needing ventilation. The unit will operate in any position, and can be converted



from an exhauster to a fresh air supplier simply by changing the position of the nozzle adapter.

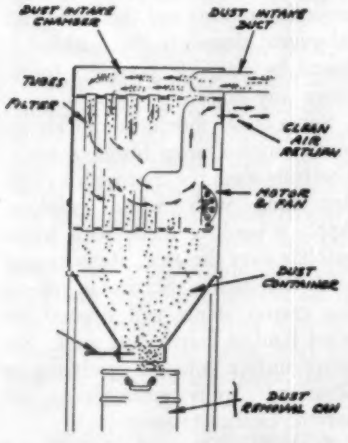
With the newly designed blower wheel, it will deliver up to 1350 CFM of fresh air through a single outlet, or 155 CFM through four separate 50' lengths of flexible hose. It can be used effectively as an exhauster for welding areas, maintenance shops, garages, around groups of machines or process tanks, inside of tanks, chambers or large vessels, and in a variety of other ways for dust and fume control. Because of its light weight, it can be used by repair crews that move from job to job. Made by Chelsea Fan & Blower Co., Inc.

For details, use Key # DF-15 on Inquiry Card on page 71.

SELF-CONTAINED DUST UNIT

A COMPLETELY self-contained dust control unit that permits either recirculation of the cleaned air within the working area or exhausting of the air to the outside is offered by the Surty Mfg. Co. The unit can be equipped with wheels and moved to any place where needed and can be used to collect dust from one or several machines.

Dust is drawn into the intake chamber, is caught by the filter tubes, and drops into the removal



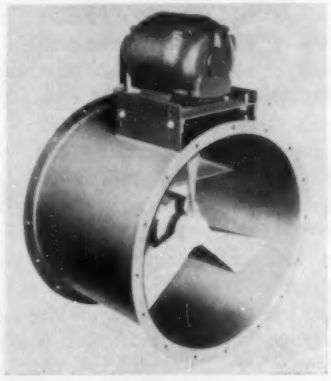
can. The frequency of cleaning the tubes and emptying the can will depend on the type of dust and extent of use.

For details, use Key # DF-16 on Inquiry Card on page 71.

TUBE-AXIAL FANS

A NEW LINE of belt-driven tube-axial propeller fans designed for handling corrosive exhaust, high temperature, explosive fumes and similar difficult air-moving applications is being introduced by Propellair Div., Robbins & Myers, Inc. Available in five sizes from 16 through 36 inches, the new fans have air delivery ratings to 26,000 cubic feet per minute.

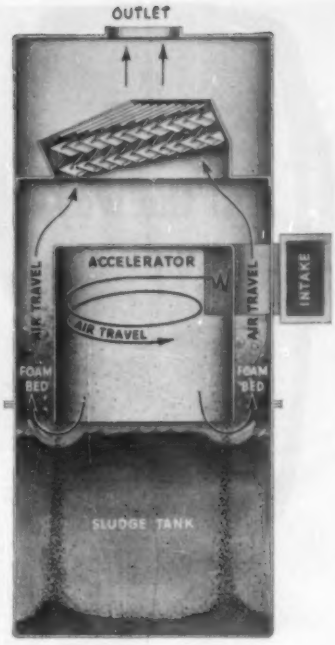
Designated as Type BT, the fan drum is rolled from 12-gauge steel plate. Integrally rolled mounting flanges and a continuous welded seam eliminate fume or condensate leakage and subsequent corrosion. Gas-tight welds prevent leakage in the belt housing. The motor-mount will accommodate any motor from ¼ to 5 horsepower, 1725 rpm, mak-



ing motor changes both practical and simple. The V-belts are resistant to high temperature, oil-proof and static-free.

Propellers are cast from a special aluminum-magnesium alloy which provides extremely high tensile and shock strength and greater corrosion resistance to mild alkalis. A rigid, one-piece cast-iron housing isolates the fan bearings from the polluted air stream. Three bearing assembly designs are available: totally-enclosed, ventilated (for high temperature requirements) and corrosion resistant.

For details, use Key # DF-17 on Inquiry Card on page 71.



HYDRO-FOAM COLLECTOR

The level of the water in the sludge tank and the depth and density of the foam bed above are maintained constant by an automatic metering device.

WET-FOAM DUST COLLECTOR

AN EFFECTIVE and economical means of eliminating contaminant dust particles exceeding 10 microns is claimed by The R. C. Mahon Co. for its Hydro-Foam Dust Collectors. They are available in standard units ranging from 3000 to 12,000 cfm and can be manifolded together in batteries of two, three or four to a common sludge tank. As shown in the drawing, the dust-laden air is forced down through the center cylinder and the particles are screened out as the air rises through the foam bed.

For details, use Key # DF-18 on Inquiry Card on page 71.

Correction

THROUGH A printer's error in the July issue of SAFETY MAINTENANCE, it was implied that the Genesee Valley Safety Conference had been held in Rochester, N. Y., in May of this year. The conference is announced for May 22, 23, and 24 of next year, 1956.

For overhead maintenance — up to 14 feet

SAFETY DIRECTORS like these mobile ladder-trucks because the automatic safety control locks truck—makes it a stable work platform—with 4-way guard rail protection for operator.

OPERATORS like Safe-Lad because all tools and equipment are always handy in the base tray—and they always feel secure and comfortable.

MANAGERS like Safe-Lad because it reduces overhead maintenance costs—in some cases by as much as 50%.

For complete specifications, write—

SAFE-LAD
Manufacturing Company

1003 S E Morrison • Portland 14, Oregon

(Use Key # H-18 on Inquiry Card on page 71)

How to Clean Marble

(Continued from page 23)

sometimes be removed by using this type of cleaner on a wet sponge preceded and followed by washing with a specific solution usually contained with the cleaner.

On flat surfaces such a cleaner can be sprinkled lightly over the stain and water added. Do not leave in place over a half hour, reapplying if necessary. Polish is usually dulled by this treatment. Mixed with a poultice the cleaner can be made into a paste with water. The poultice made in this fashion can be left in place until it is dry before removal.

Tobacco stains can be removed by bleaching as you would organic stains. Urinal stains can be removed with poultices of marble detergent and peroxide bleach. For iodine stains apply a poultice of whiting and alcohol. In the case of ink stains much depends on the kind of ink that made the stain. Ammonia-saturated cloths, crystal cleaner poultices, or alternate alcohol-ammonia wettings are all suitable for various kinds of ink.

Superficial smoke stains can usually be removed by thoroughly washing and scrubbing with an abrasive cleaner. Lead stains in the presence of cement and salts will impart yellow-orange stains to marble. Usually these stains are a great distance from the joint and at the point where the lead-alkaline solutions evaporate at the surface of the stone. The only way to remove these stains is to saw out the lead. Eventually the stain will disappear. Flashings of lead should not be buried in cement joints where water is apt to lodge.

Paint should be removed as soon as possible from marble to limit the entry of linseed oil. Remove the surface paint with a razor blade or knife. There are 2 ways to proceed: either, apply a poultice made with benzol covering an area larger than the stain, remove when dry and bleach remaining color with peroxide poultices; or, apply liquid or paste varnish and paint remover over stained area, remove with cloths after a short period, scrub with a fibre brush and marble detergent, then bleach out remaining color with a peroxide poultice or solvent poultice for oil stain.

Deepseated fire stains require poulticing with alternate treatments of solvent cleaner and peroxide bleach. Lipstick stains are a combination of color and wax-like materials. Abrasion or bleaching will remove the color. The wax-like part, which is difficult to see except when the stone is wet, and which then appears as a white mark, can sometimes be removed with poultices of alcohol.

Copper and bronze stains are usually the result of run-off from oxidized plaques (contest winners beware!). They are usually muddy brown and green. It is useless to try to remove them until the source has been cleaned and protectively coated to prevent oxidation. These stains can sometimes be removed by mixing together in dry form one part of ammonium chloride (Sal Ammoniac) and 4 parts powdered talc or whiting. Add ammonia water and stir until a thick poultice is obtained. Place over stain and leave until dry.

Linseed oil stains come from an unwise use of oil paints or oily mastics and putty near or in conjunction with marble. If they become oxidized they will be difficult to remove. If putty or mastic is the cause remove from joints and then apply an oil-solvent cleaner to the marble followed by peroxide poultices to remove any color.

Spots of tar should be quickly removed with a razor blade or knife. Carefully wash the spot with a cloth dampened with white gasoline. Apply a poultice made with white gasoline over the area. Remove and wash thoroughly. Success in removing crayon stains will depend on what kind of crayon was used. Remove surface color by scrubbing or abrasion. Apply poultices of oil solvent cleaner to spots.

If marble is cleaned regularly and properly, and if any stains which appear are attacked immediately, it should retain its beautiful appearance almost indefinitely.

From "Marble Cleaning Methods and Materials" by the Vermont Marble Co.

Agriculture Needs Industry's Safety

FARMING TODAY perhaps presents more occupational hazards than any other industry," says Dr. A. L. Schultz in the Journal of the National Chiropractic Association. "In fact, records show the farmer has the highest rate of industrial injuries. He has left the horse and buggy era, and has now grown, with the aid of modern machinery, into the class of heavy industry."

Pointing out that it is not alone the use of machinery but also chemicals which provide new hazards, Dr. Schultz states "the farmer must also be a chemist and know about the detrimental effects of the sprays and chemicals that he uses on weeds, his livestock and seeds. These substances have a damaging effect upon his own system, particularly the skin, mucous membranes and lungs."

The doctor recommends that farmers adopt the same preventative measures as have become standard in big industry. When the farmer must use sprays, he should wear gloves, keep his shirt sleeves rolled down, and wear a mask to protect the lungs from chemical vapors. Using hard topped hats, as in the oil industry, should be adopted as a preventive measure on the farm.

"Headlines reading 'Farmer Killed In Fall From Windmill' and similar accidents," says Dr. Schultz, "indicate farmers should own and use safety belts such as are mandatory for telephone and power company linemen. These should be used when they repair windmills or have to climb other high objects on the farm. Like most railroad men they should wear shoes with steel toecaps to prevent the many toe injuries."

Agriculture, a big business, is made up of small units and therefore a "safety first" program on an organized basis is difficult. Dr. Schultz recommends that farmers call group meetings several times a year to discuss safety first measures.

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(For details, use Key # H-19 on card on page 71)

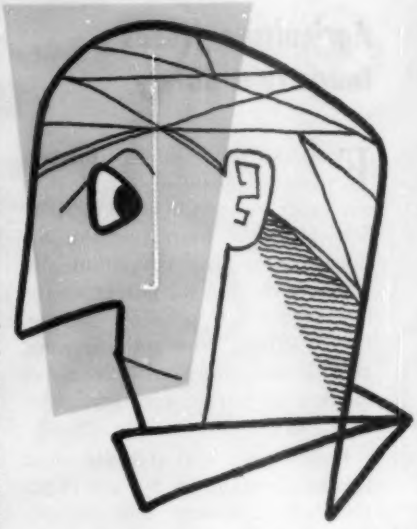
President's Conference

PRESIDENT EISENHOWER will open the next President's Conference on Occupational Safety, which is scheduled to be held in Washington on May 14–16, 1956, the United States Department of Labor has announced.

Held biennially, this Conference brings together leaders of American business, labor, Federal and State officials, insurance, education, and private safety organizations to devise cooperative means of further reducing occupational injuries.

The industries of primary concern to the Conference include construction, manufacturing, utilities, fiance, trade, service and government. Steady declines in the injury frequency rate for manufacturing have been recorded for the past three years, reaching a new all-time low of 11.5 injuries per million manhours worked in 1954.

Learning..... the hard way



DEAD DRUNK . . .

IS A COMMON expression often used in jest . . . but with wood alcohol as the intoxicant it can often be deadly true. Wood alcohol affects the nerves of the eyes, sometimes causing total blindness. Other symptoms are irritation of the nose and throat, headache, drowsiness, chills, irregular heart action, etc.

Occupations in which workers may be exposed include the manufacture of artificial flowers, felt hats, rubber, shellac and varnish, explosives, boots and shoes, antifreeze, linoleum and artificial silk and leather, to name a few.

While handling wood alcohol may cause local inflammation and some absorption through the skin, the principal danger lies in inhalation of fumes. The poison may, of course, be taken in large amounts, and result in fatal intoxication but in most cases the damage is done by breathing small amounts over a period of time, resulting in an accumulation in the body tissues. Extent of injury, therefore, depends on how soon the exposure is detected and controlled.

Processes using wood alcohol should be isolated. Local exhaust should remove fumes at the point of origin. Inspection of ventilating equipment should be regular and thorough. Standard tests should be made for concentrations of fumes in the air. Some authorities feel that more than 100 parts, per million parts of air, tends to become unsafe. It is in the cumulative effects of this poison that much of its danger lies.

For maximum protection, any operation that involves the use of wood alcohol should be investigated carefully.

YOU WON'T MELT . . .

IN THE YARD of a pump operating plant two buried gasoline tanks were used to test a submerged type of gasoline pump. During a routine test it began to rain. The testing crew pulled the pump out of the tank and went inside the plant. They forgot to replace the cover on the tank opening before they left.

The rainstorm developed into a cloudburst, and the surface water ran into the tank sending the gasoline overflowing down the driveway and into the street. Sewers were clogged and the streets became flooded. A local bus made a stop in the area. When it started up, the gasoline on the water ignited. Fortunately all the passengers on the bus escaped injury, although the bus was badly damaged. The fire was so intense that numbers of windows in the plant were broken and one sprinkler head on the first floor opened. A section of brick wall had to be replaced because it was so badly damaged by the intense heat.

All this could have been avoided, if the men testing the gasoline pump had not been so anxious to escape the rain that they forgot the duties of safety. There is no guard or rule to force a man to act coolly in a situation. The best we can do is to familiarize him with his job and its safety precautions, and train him as best we can by discussing most of the possible situations that can come up before they happen.

Audiometric Guide

TO PROVIDE assistance in the medical control phase of the industrial noise problem, a "Guide for Industrial Audiometric Technicians" has recently been published. The manual is the result of extensive experience in conducting training programs for hearing specialists. Subjects covered include: physics of sound, anatomy and physiology of the ear, the audiometer, care and maintenance of audiometers, techniques of measuring hearing, standard procedure, records and forms, plan for audiometric testing room, and an outline of an audiometry training program. Copies of the guide are available free from: Employers Mutuals of Wausau, Wausau, Wisc.

Problems of Workmen's Compensation

The proceedings of the 1954 Convention of the International Association of Industrial Accident Boards and Commissions are now available from the U. S. Department of Labor's Bureau of Labor Standards as its Bulletin 180, "Workmen's Compensation Problems." In addition to the Committee reports and discussions, this bulletin includes many excellent papers by prominent workmen's compensation officials and outstanding medical men. Panels on "Adequacy of Workmen's Compensation," "Rehabilitation of Injured Workers," Noise in Industry," and "Principles and Methods of Expediting Hearings and Settlement of Claims in Contested Cases" were among the topics considered at this convention. An address by Under Secretary of Labor Arthur Larson on "The Future of Workmen's Compensation" is also included.

A limited free supply of this publication is available from the Bureau of Labor Standards, U. S. Department of Labor, Washington 25, D. C. Sales copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 65 cents each.

What Causes Accidents?

HUMAN BEHAVIOR is responsible for 70 to 80 percent of industrial accidents, according to a report published by New York University's Center for Safety Education.

John C. Larson, research associate at the Center and author of the report, says that although much is known about the relationships of safety engineering, diseases, disorders, and physical working conditions to accidents and injuries, "statistics indicate that these factors account for only 20 to 30 percent of industrial mishaps." He adds that human behavior "apparently accounts for the remainder."

The study, entitled "The Human Element and Industrial Accident Prevention," shows that such factors as personality characteristics, adjustment to a new job, rejection by coworkers, excessive fatigue, low morale, a tendency to be overly critical of the job, and lack of promotions are high among the causes of accidents.

"Although a physical working environment contributes to accidents," the NYU safety researcher explains,

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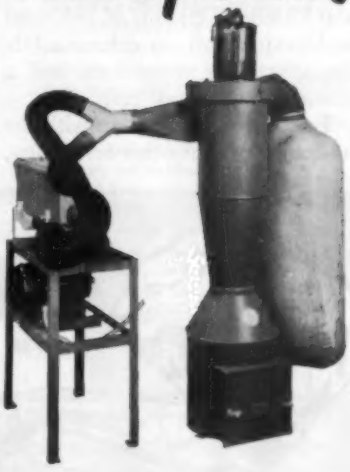

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"the social and psychological climate does so to an even greater degree. Financial considerations are more tangible than prestige, but responsibility promotion possibilities, and other factors of morale and job satisfaction tend to assume greater importance in the minds of workers."

The report contains summaries and interpretations of more than 200 studies which were screened from 500 abstracts of research projects. Much of the material originally appeared in safety studies in medical, psychiatric, opthalmological, optometric, psychophysical, psychological, and sociological journals, texts, and periodicals.

The safety study contains sections on hiring procedures, orientation, training supervisors and foremen, training workers, morale, job satisfaction, and predicting accidents. It also includes a critique of industrial accident research, an extensive bibliography, four appendices, and a glossary of technical terms.

Prepared by Mr. Larson with the assistance of four other researchers, the study is intended as a guide and reference work for safety engineers, personnel directors, researchers, training directors, industrial psychologists, safety supervisors, college and university instructors, and industrial physicians.

Single copies of the report are available for $2.00 and there are special rates for quantity orders. Further information about the report may be obtained from the Center for Safety Education, Division of General Education, New York University, 6 Washington Square North, New York 3, New York.

Directory of Testing Laboratories

NATIONAL BUREAU of Standards Miscellaneous Publication M187, *"Directory of Commercial and College Laboratories,"* has been withdrawn from circulation. An up-to-date revision of this publication is now available in the *"Directory of Commercial and College Testing Laboratories,"* recently issued by the American Society for Testing Materials. The two organizations have agreed that ASTM undertake the responsibility for compilation and publication of the Directory in the future.

The Directory gives information regarding the location of testing laboratories together with the types of commodities and the nature of the investigations the laboratories are prepared to undertake. It is designed to be of assistance to the large number of purchasers who are not equipped to make their own acceptance tests and who therefore have hesitated to buy on specifications. It should also be of value to small manufacturers and others who are seeking testing laboratory services in the evaluation of raw materials and finished products.

The new Directory may be obtained from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pennsylvania, at $1.00 a copy.

Hiring the Handicapped

A PROPOSAL FOR employers to eliminate remaining barriers to the employment of people with physical handicaps has been made by the National Association of Manufacturers.

The proposal was made in a new "Guide for Employers in Hiring the Physically Handicapped," which was prepared by a committee of industrialists in response to the expressed wishes of employers. The 32-page guide describes step-by-step procedures which industry has found successful in matching handicapped workers to jobs which they can do as well as able-bodied persons.

The handbook contains detailed suggestions covering company policy; recruiting, interviewing and placing of job applicants; the training of employees; and follow-up procedures to assure satisfactory job performance, safety, and a feeling of well-being on the part of the new employee.

The NAM publication stressed that production records covering thousands of handicapped persons

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(For details, use Key # H-21 on card on page 71)

in industry indicate "beyond any question that so-called 'handicapped' workers are equal to and in some instances better than their able-bodied associates in such important factors as attendance, turnover, safety and productivity."

Copies of the guide are available from the National Association of Manufacturers, 2 East 48th St., New York 17, at 50 cents each.

Knife Grinding and Woodworking Manual

THE second edition of a book written by C. G. Monnett, Jr. has just been released to the general public. The book contains 167 pages and 187 pictures, charts, and drawings, and is thought to be the most complete book of its kind published in this country.

The following are some of the subjects covered by the "Knife Grinding and Woodworking Manual": Grinding Knives; Setting Knives; Moulder Operations; Wood Defects; Balancing Knives; Composition and Care of Grinding Wheels; Jointing Knives; Development, Selection and Care of Cutterheads and Knives; Cutting Angles and Bevels; Cutting Speed, Feed Speed, and Energy Consumption of Machining Wood; Moulder and Planer Machine Stoppages and Their Remedy; Structure of Wood; Lumber Abbreviations; Common Woodworking Pattern Names; Safety, and many other worthwhile subjects.

Copies of the manual may be obtained by writing to C. G. Monnett, Jr., Vice-President, Dependable Machine Company, Greensboro, N. C. Price of the book is $4.50 plus a $.50 postage and handling fee.

Two Safety Manuals

RECOGNIZING THAT its field workers are often faced with problems over and beyond those met with in the shops, Allis-Chalmers has issued for their use a 75-page pocket-size field service safety manual.

Included in the manual are tips on the proper use of hand and portable power tools; on good housekeeping, material handling, motor vehicle operation, fire prevention and extinguishment, fundamentals of good hitching; safe practices for carbon tetrachloride, dry ice, asbestos, sulfuric acid; preventive measures for control of or protection against dust; first aid principles, and the prevention of accidents in the field.

To help maintain a high standard of safety in the operation of its in-plant railroad system, the company has also adopted and placed in manual form a comprehensive outline of basic railroad practices.

As portrayed and described in the manual, these rules cover signaling, blocking, coupling and switching, movement of cars, loading operations, boarding, traveling and descending, maintenance, and bad order and breakdown rules. In addition, it carries special rules for railroad derrick crews.

Single copies of either manual are available on request from the Safety Services Department of Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.

(Continued on page 68)

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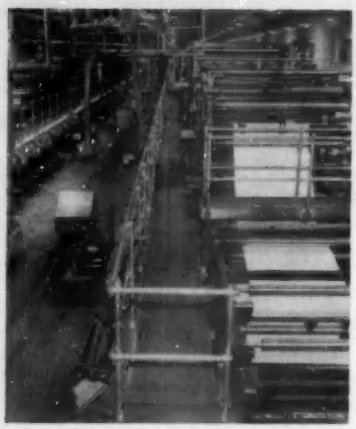
A SAFETY IDEA

THE PRESSROOMS of the new plant of *The Philadelphia Bulletin* have close to 26 thousand square feet of non-skid steelplate on all walking surfaces at the pressroom level, including walkways on the presses and along all conveyors; on transfer tables and on the floor of the huge freight elevator that serves the pressroom. The newspaper's goal is to make its new ultra-modern printing plant the safest operation of its kind in the world.



Non-skid metal flooring material is used throughout newspaper pressroom to provide safety for all employees.

The abrasive rolled steel floor plate is made by a process in which abrasive grain, the same type used in grinding wheels, is rolled as an integral part of the upper portion of steel floor plate, to make a strong, tough, skid-proof flooring. The plate is especially effective where ink mist, oil, grease or other liquids make walking hazardous.

Picture by courtesy of Alan Wood Steel Co.

If dunked in the drink . . .

THIS MAN WILL NOT SINK!

BOOM MEN at Weyerhaeuser Timber Company's Everett (Washington) lumber division are no happier about falling in their Snohomish river log pond than they ever were, but feel a lot more confident about floating than they did a month or so ago.

During wet, windy weather the men who jockey the big sticks around the pond wear bright yellow rain coats and pants, with built-in life preservers. Inside each jacket are 28 air tubes and lining the pants are 2 king-size tubes. The combination makes it literally impossible for a man to sink, no matter how big his shoes or how heavy his clothing.

"We have been looking for a long time for a way to make working on the pond safer," explains Keene Strobel, the Everett lumber division safety engineer. "But every sort of life preserver we tried proved bulky and awkward.

"By buying regular rain jackets and pants, and having a local firm make the life-saving lining to our specifications," claims Strobel, "we have come up with what seems to be the best answer yet to the potential danger of working on the pond."

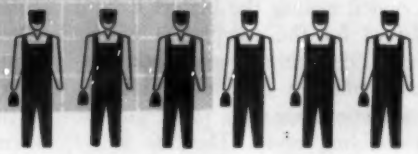
Design of the new safety gear was the result of 6 months' trial on the pond by boom men. The inflatable air tubes are fastened to the inside of the rain clothing with snaps.

Life preserver equipment is also worn by boom men at the company's Springfield, Klamath Falls and Coos Bay branches in Oregon and at the White River branch at Enumclaw, Washington.

Bright yellow, heavy-duty, neoprene-covered canvas jacket and trousers on man in picture at upper left, keep him afloat if he should lose footing on a log in pond. At left he displays inflated plastic air tubes snapped inside jacket to superior.

Pictures by courtesy of Weyerhaeuser Timber Co.

SAFETY ACHIEVEMENTS



THE TRAILMOBILE TROPHY, A national award in the trucking industry for highway safety, was presented for the second year in a row to Pacific Intermountain Express, Oakland, Cal., during the annual meeting of the American Trucking Associations Council of Safety Supervisors. The Trophy was presented on the basis of the firm's outstanding highway safety record, driver selection and safety training programs, special safety equipment, records of assistance to motorists and voluntary highway courtesy and service programs.

• • •

DU PONT EMPLOYEES, NEARLY 90,000 of them, reduced their off-the-job injury frequency rate in 1954 by 20 percent from the preceding year, suffering an average of 5.05 time-losing injuries per million exposure hours while away from work, as compared with 6.35 in 1953. Both of these figures are substantially lower than the latest available all-industry on-the-job rate of 7.44 which, in turn, is generally conceded to be much lower than the over-all frequency rate for the general public. Du Pont began to tabulate off-the-job injuries in January, 1953. The early figures turned up two significant facts:

First, Du Pont employees had less injuries off the job than did the general public. This indicated that safety consciousness on the job tends to create safety consciousness off the job.

Second, Du Pont employees were far safer at work than away from work. This indicated the need for a program to improve safety performance off the job.

After two years, the program is paying off, not only in improving performance off the job, but in contributing to the new on-the-job record of only one lost-time injury for each three million man hours worked. More than half of the 1954 off-the-job injuries resulted from two causes; the automobile, and slips and falls.

• • •

EMPLOYEES OF NATIONAL TUBE Division's Lorain Works have received the National Safety Council's the Award of Honor. To qualify for the award, the plant established an all-time low injury frequency rate in 1954 of 1.10 and an all-time low severity rate of .15. This compares with corresponding rates for the period 1951–1953 of 1.60 and .57, respectively. During the year, a period of 76 consecutive days without a disabling injury was worked. This amounted to an injury-free accumulation of over four and one-half million man-hours—an all-time plant record.

• • •

IN RECOGNITION OF AN OUTSTANDING safety record, the Ray-O-Vac Company in Madison, Wisc., has been awarded a plaque for their "contribution toward the conservation of life, health and happiness." The award was made by the company's insurance carrier. The Ray-O-Vac Madison group's accident frequency for the past year was 3.9 and the severity record .033.

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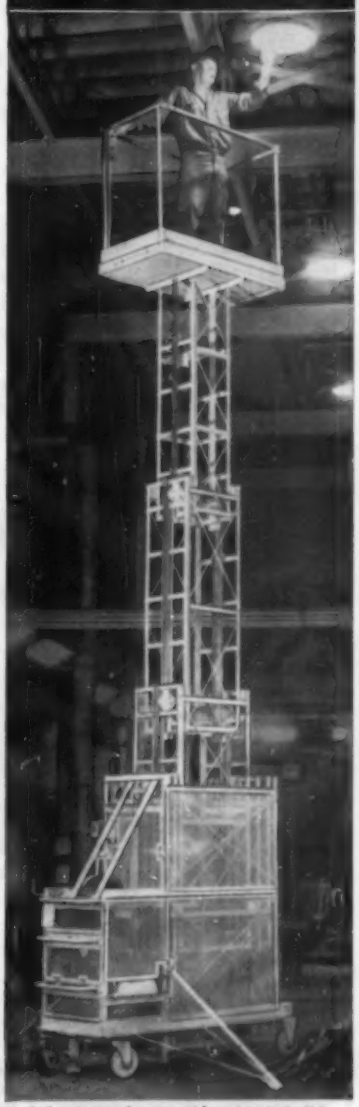

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(Use Key # H-25 on Inquiry Card on page 71)

MIDVALE, OHIO, COAL DIVISION OF the Columbia-Southern Chemical Corporation has been awarded both a plaque and trophy for winning first place in the first aid demonstrations conducted at the all-Ohio Safety Congress. The Midvale plant's first aid team becomes eligible to compete in the National First Aid Contest to be held at Knoxville, Tennessee, this coming fall.

• • •

THE GLENOLDEN, PA., PLANT OF Sharp & Dohme, Division of Merck & Co., Inc., has received five major safety awards as the result of a perfect safety record over the past two years.

The awards include the No-Accident Award, for completing an entire year without a disabling injury and an Award of Honor for one million man-hours without a disabling injury, both from the Philadelphia Safety Council, and also an Award of Achievement for a 10 percent reduction in frequency.

Operations at the Glenolden plant will be moved to the West Point, Pa., plant in the near future. The West Point plant, with a five-year average accident frequency rate of less than 1.0, has the best five-year safety record of the three Sharp & Dohme plants.

Awards from the National Safety Council include the Perfect Record Award for the completion of the year 1954 without a disabling injury, and the Certificate of Commendation, for two years without a disabling injury. The fifth award is the Certificate of Achievement presented by the Manufacturing Chemists Association for an injury-free year.

• • •

THREE CHEMICAL COMPANIES WERE presented with the Lammot du Pont Safety Plaque awards at the annual meeting of the Manufacturing Chemists' Association. The awards are made annually to the chemical companies showing the greatest improvement in plant safety over a five-year period.

The winner among those companies whose employees worked more than 2,000,000 man-hours annually was the American Potash and Chemical Corporation (Los Angeles, California).

Among firms whose workers put in less than 2,000,000 man-hours annually, duplicate awards were presented to Detroit Chemical Works (Detroit, Mich.) and Tennessee Copper Company (New York, N. Y.). The tie, first in the history of the annual awards, came about when both firms showed an identical percentage decrease in accident frequency rate for the contest period.

Stauffer Chemical Company (New York, N. Y.) was runner-up in the over 2 million man-hour category and Eastern Gas and Fuel Associates (Boston, Mass.) was runner-up in the under 2 million man-hour classification.

The chemical industry, one of the safest in the country, set a new all-time safety record in 1954 with lost-time accidents in the industry reduced to 3.27 per million man-hours worked, an 11 percent improvement over 1953. Accident severity rate declined to 0.49 per thousand man-hours worked, a reduction of 40 percent over 1953. The MCA safety performance report covers plants in North America representing over 757 million employee hours of exposure.

• • •

RECEIPT FOR 1954 OF THE NATIONAL Safety Council's Award of Honor, is announced at Troy, N. Y. by Behr-Manning Division of Norton Company. Nearly 2,000 employees worked nearly 4,000,000 man-hours with only 12 lost-time or disabling injuries. Behr-Manning attained a frequency of injury 69 percent better, and a severity rate 90 percent better, than the average for its industry.

Commenting on the award, Safety Manager Wilbur E. Kidder said, "This was a group effort of which every man and woman at Behr-Manning may be proud. This year we hit the top as the result of a safety program that had the support and participation of every individual in our company."

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(For details, use Key # H-24 on card on page 71)

MISSOURI PACIFIC BUS LINES HAS announced that eight of its motor coach operators have been presented with awards for driving more than a million miles each on the highways without chargeable accidents and eight more are on the eve of attaining the million-mile mark.

E. L. Moore, who drives a daily run between St. Louis and Kansas City, has 1,314,858 miles of accident-free operation to his credit, while E. M. Hammonds, who now drives daily between Monroe, La., and Natchez, Miss., has 1,206,291 miles. Others who have received awards for a million miles or more of accident-free driving are L. A. Kercheval, Houston, Texas; L. B. Billingsley, Houston; J. W. Terry, Little Rock; R. G. Wilkerson, Little Rock; C. M. McCourt, Kansas City; and W. E. Barlow, Kansas City.

• • •

THE AWARD OF MERIT FOR SAFETY, the highest made by the Department of the Army, has been presented to Major General John H. Stokes, Jr., commander of the Military District of Washington, in recognition of the outstanding record of his command for the year 1954. Similar awards will also be made to the Third Army, Fort McPherson, Ga. and the Fifth Army at Chicago, Ill.

The award recognizes significant improvement in accident experience or maintenance of an outstanding record of effectiveness over the two prior years. Qualification for the award is established by regular inspections during which the command must also be rated superior on its accident prevention effort, interest and participation in the program, qualifications of safety personnel, reporting procedures and the quality of educational, promotional and training efforts.

Safety Appointments—

Eliot V. Parker, under whose direction the safety programs of the United States Army were conducted during the last 14 years, has been appointed Chief of the Safety Division of the U. S. Department of Labor's Bureau of Labor Standards, Secretary of Labor James P. Mitchell announced.

The Bureau devises and promotes safety programs in industry, conducts safety training courses, and provides the secretariat for both the Federal Safety Council and the President's Conference on Occupational Safety. It provides safety service to employers and workers in the Maritime industry and to the agencies of the Federal Government and functions both as a clearing house for safety information and as advisor to States and industry.

R. C. Sabens, of Cleveland, Ohio, superintendent of safety for the New York, Chicago and St. Louis Railroad, has been elected chairman of the Safety Section of the Association of American Railroads. Mr. Sabens, who has served as vice-chairman of the A.A.R. Section for the past two years, succeeds J. R. Thexton, of Hoboken, N. J., superintendent of safety for the Delaware, Lackawanna and Western Railroad. Installed as vice-chairman for the ensuing year was R. S. James, of Denver, Colo., superintendent of safety and fire prevention for the Denver and Rio Grande Western Railroad.

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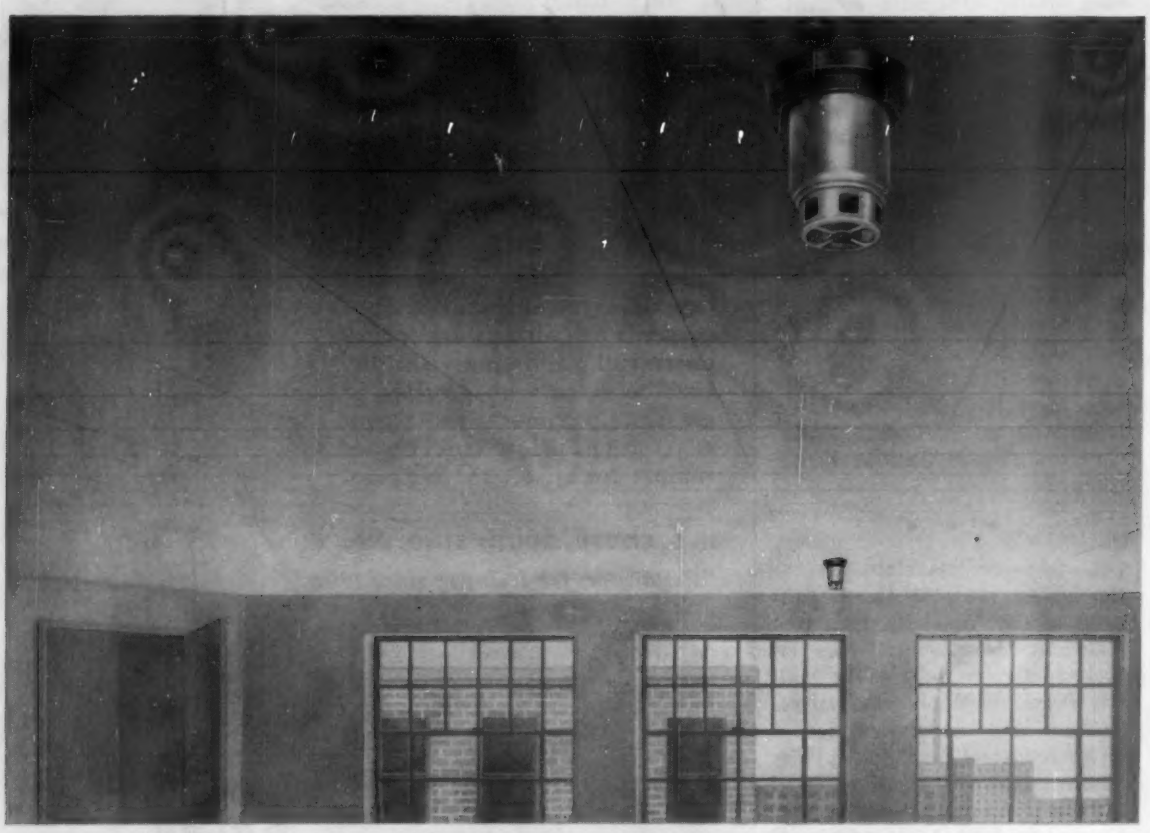
New, radio-active, automatic fire guard!

C-O-TWO PRE-DETECTOR SYSTEM



Each pre-detector head protects up to 3,600 square feet of area ... harmless radio-active element utilizing ionization chamber principle quickly detects all forms of fire ... requires only simple two-wire circuit and insignificant wall space for controls.

This completely new and positive means of spotting fire is just what you've always needed and wanted . . . detects in the earliest stage, invisible combustion gases, visible smoke, slow smoldering, as well as open flame. The C-O-TWO Pre-Detector System is simple to install, extremely economical to maintain and doesn't depend on thick smoke or heat for actuation.

As many pre-detector heads as necessary can be connected together in a single circuit and up to 16 separate circuits or spaces handled by one system. With a single circuit the pre-detector heads are connected directly to the fire indicating cabinet, while with multiple circuits the pre-detector heads are first connected to one or more space indicating cabinets capable of visually showing by number the exact location of the fire. Relays perform such functions as sounding alarms, closing fire doors, shutting down ventilation and releasing fire extinguishing systems.

The C-O-TWO Pre-Detector System has been subjected to extensive testing and carries Underwriters' Laboratories, Inc. listing, as well as Factory Mutual Laboratories approval. Proven pilot installations have been made in such diversified properties as a television station, an electric power company network analyzer room, a railroad signal tower, an airline flight training equipment room and the offices of an insurance company.

Don't take unnecessary chances any longer . . . the extensive fire protection experience of PYRENE—C-O-TWO over the years is at your disposal without obligation. Get complete facts about this new C-O-TWO Pre-Detector System today!

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(For details, use Key # H-26 on card on page 71)

The Fire Front

Civil Fire Defense

HAVING HALF a city where the whole might have been destroyed, still represents just so much on the plus side, was the affirmation made by speakers at the National Fire Protection Association 59th annual meeting.

"This is no time to throw up our hands and say that the magnitude of the problems is too great in the face of atomic and hydrogen bomb warfare," Horatio Bond, Boston, NFPA Chief Engineer, told a panel session of the Fire Marshal's Section.

"Any efforts to propagate programs to expedite evacuation of population before impending attack are worth while, in my opinion," said another panelist, George J. Richardson, Washington, Secretary-Treasurer, International Association of Fire Fighters.

"We have a problem in Canada that our friends down here don't often think of: we realize that invading bombers from the north would be shot down over our territory, and that the bomb loads of a large proportion of those planes would be detonated when the hits are made or the plane crashes," W. J. Scott, Toronto, Ontario, Fire Marshal of his Canadian province, commented.

"Radioactivity is not only a wartime hazard but is rapidly becoming a peacetime problem," Lloyd Layman, Battle Creek, Michigan, Director, Fire Office, Technical Advisory Services, Federal Civil Defense Administration, said in introducing the panel. He urged more widespread training, among fire departments, in use of radioactivity monitoring instruments.

Monitoring instruments were discussed by several speakers, and there was emphasis also on the problems of effective organization of fire departments for meeting emergencies of modern bombing.

"A large number of small units can't work smoothly together," Mr. Bond said, commenting that the core of CD fire fighting planning still should be the large metropolitan departments, not just because of their high degree of organization but because they could afford equipment, training and facilities not available to small departments. Organization of departments on a state or provincial basis might be the answer to the problem, he suggested.

"I am convinced and I am confident that other students of this problem will agree that conventional fire fighting equipment and methods are inadequate to the task of wartime fire defense," Mr. Layman said. "I am willing to admit that our fire fighting techniques are based almost entirely on limited knowledge obtained from trial and error (mostly error) on the fireground."

"The time is overdue in this field for basic scientific research to determine the natural laws that govern combustion, flame production, mechanics of the flame or thermal column, and flame extinguishment."

It was Mr. Layman who commented on the "peacetime problem" of radiation: "The use of radioactive materials in industry is increasing and they are being transported daily by common carriers, therefore, fire service personnel must be trained and equipped to deal intelligently with this hazard." It is not a complicated subject, he said: an ordinary fireman can learn enough, in a half hour, to be able to protect himself and his fellows from over-exposure to radiation.

May Losses Climb

ESTIMATED FIRE LOSSES IN the United States during May amounted to $71,789,000, the National Board of Fire Underwriters has reported. This loss represents an increase of 15.3 percent over losses of $62,282,000 reported for May 1954, and a decrease of 8.7 percent from losses of $78,632,000 for last April (1955).

Losses for the first five months of 1955 now total $398,929,000 an increase of 2.2 percent over the first five months of 1954, when they amounted to $390,457,000. These estimated insured losses include an allowance for uninsured and unreported losses.

Fire Problems

RIDDLE: What possibly could hospitals, lumber yards, the cotton industry, clothing manufacturers, and laboratories using radioactive materials have in common?

ANSWER: The threat of fire.

Representatives of these otherwise unrelated interests shared a common platform and sought a common goal at the National Fire Protection Association's 59th annual meeting in Cincinnati.

(Continued on page 62)

The Mechanics of Fire

By **DAWSON POWELL**
Technical Editor
Grinnell Company, Inc.

A PICTURE of the life cycle of fire in Class A materials (which shows us new ways of attacking fire and preventing its spread, permits more accurate appraisal of potential fire situations and supplies an outline for understanding fire extinguishment) has been developed by correlating the research conducted in the Grinnell Fire Control Research Laboratories and the published reports of research conducted at the U. S. Bureau of Mines.

For what it may contribute to an understanding of the ways in which water extinguishes fire, the following ***simplified*** description of the Mechanics of Fire is offered. This discussion limits the definition of "Fire" to: "The principle of combustion as manifested in light and heat, especially ***flame***."

The six observable or measurable factors in the life cycle of a Class A fire are as follows:

1. Input-Heat
2. Fuel (A Vapor or Gas)
3. Oxygen (From Air)
4. Proportioning
5. Mixing (For Near-Burning or Remote-Burning)
6. Ignition Continuity

Examples will be cited showing the influence of each of these factors on the starting, spread or extinguishment of fire.

Editor's foreword: The accompanying explanation of "The Mechanics of Fire" summarizes talks given by the author to trainees and promotion classes of the Providence Fire Department, semi-annually since 1947; to the Providence Naval Reserve Ordnance Unit 1-3 & Supply Unit 1-2 in 1948; to the Fall General Meeting of the American Institute of Electrical Engineers in 1951; to the E. I. duPont deNemours Fire Protection Conference in Wilmington, Del. September 1953; and to the University of Maryland Short Course for Fire Inspectors also in 1953. It amplifies the "Fire-triangle" explanation to make it practical and useful in analyzing special hazard fire situations.

Input-heat, such as that supplied by friction to the chemicals forming the head of a match, initiates combustion. Burning of the gases from the chemicals then distills vapors or gases from the wood of the match, and these vapors or gases also burn as flame. Although wood is classed as a flammable material, it is generally recognized that wood does not burn as a solid; nor oil as a liquid. The actual FUEL is the vapors or gases from these solids and liquids.

Flame Behavior

As in the case of the match, it is necessary to have a source of input-heat to initiate fire, and it is equally essential to have a continuing source of input-heat if the fire is to continue and to spread. The function of supplying input-heat for the distillation of vapor fuel after the chemicals of the match head have flared and exhausted themselves is taken over by the flame of the burning vapors. If this heat is dissipated into the atmosphere by holding the match head upright, distillation of fuel from the match stick gradually diminishes and the flame goes out for lack of fuel. (Figure 1) If the match head is tilted downward so that the flame surrounds fresh wood of the match, input-heat from the flame maintains the supply of fuel (distilled vapors or gases) and the fire spreads up around the match stick. (Figure 2) This difference in a match's behavior is well known to pipe smokers, who want a broad flame for an even light, but its significance in the life cycle of fire is generally overlooked.

To prevent fire or limit its spread, Fire Protection engineering uses a considerable number of standard devices which depend for their effectiveness on preventing input-heat from reaching materials that distill off flammable vapors. Some of these are fire doors and fire walls to limit fire spread; insulated, fire-resistant, safes and vaults; sprinkler water curtains outside buildings to protect them from the input-heat from exposure fires. Wetting down with fire hose sprays serves the same purpose.

A dramatic use of the "preventing input-heat from reaching potential fuel" technique is the underground coal-fire extinguishing program being carried on with the cooperation of the U. S. Bureau of Mines. A trench is excavated from the surface down through the coal seam ahead of an underground fire. Filling this trench with sand, gravel or earth fill insulates the coal in the seam ahead of the fire from input-heat as the underground fire burns up to the insulating fire wall formed by the fill. Millions of tons of coal already have been saved by this method, preserving a great natural resource for posterity.

Is Something Burning?

As soon as we have accepted the proposition that input-heat is an essential element in the initiation, maintenance, and spread of fire in Class A materials, we are ready to understand that fire in these materials is actually a vapor or gas fire. At this point we find that abundant research has been conducted by the automotive industry, the gas industry and the petroleum industry to help us complete our picture of the life cycle of fire. We also find a use for those (mysterious to so many) tables of flammable limits or explosive limits published in fire protection handbooks. We find, in fact, that we can't understand fire, its spread or extinguishment, without them.

Let us look at what happens, according to the classical theory of gases, when a mixture of flammable vapor or gas and air burns. To keep our illustration (Figure 3) simple

Fig. 1. Heat of burning vapors is dissipated into surrounding atmosphere when match is held upright, so flame goes out.

we will label all our molecules of flammable vapor or gas HC (for hydrocarbon) and all our inert gases which are present in air (I). We know that air contains about 79 percent inert gas to 21 percent active oxygen. That goes for fresh country air, but to simplify our illustration we will round off the proportions to 80 percent inert gases and 20 percent active oxygen, giving us four inerts (I) to one active oxygen (O), the simplified proportions used in Figure 3.

Molecular Collisions

The classical theory of gases teaches us that all the molecules in a gas or a mixture of gases are in motion, moving in random directions. Their free path or free travel in any direction is determined by the distance they can travel before colliding with another molecule. After each collision, each molecule starts off in a new direction, similar to what happens when two billiard balls collide, but in three dimensions. The classical theory also tells

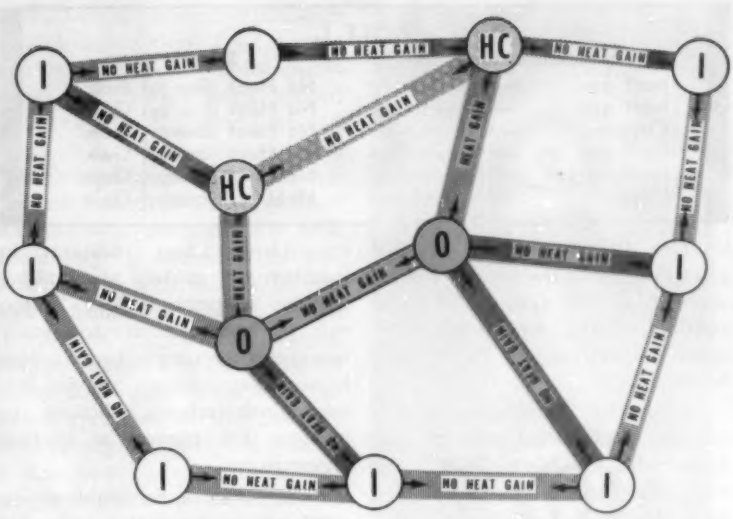

Fig. 3. Shows that only 2 possibilities for heat energy gains from intermolecular collisions occur in a gas-air mixture with 2 minimum units of air and 2 hydrocarbon molecules.

Fig. 2. If match in figure 1 is tilted down so that the flame surrounds fresh wood of the match, input-heat from the flame maintains the supply of fuel (distilled vapors and gases) and the fire spreads up around the matchstick. This difference in a match's behavior is well known to pipe-smokers as illustration shows. In order to get an even light match must be tilted downward to bowl of pipe. This behavior is also important in the life cycle of fire.

TABLE 1.

Molecular Collisions		Results
Inert gas	—Inert gas	No Heat (Energy) Gain
Inert gas	—Oxygen	No Heat (Energy) Gain
Oxygen	—Oxygen	No Heat (Energy) Gain
Inert gas	—Hydrocarbon	No Heat (Energy) Gain
Hydrocarbon	—Hydrocarbon	No Heat (Energy) Gain
Oxygen	—Hydrocarbon	Heat (Energy) Gain

us that the temperature of the gases determines the speeds of their motions, or the violence of their collision. Thus, temperature and speed of motion are directly interrelated.

In the fire reaction only the collision between oxygen (O) and hydrocarbon molecules (HC) results in an available heat (Energy) gain. A glance at our diagram will quickly show us that with the random motion of gas molecules we can expect molecular collision results as shown in Table 1. From this summary we can see that of six possible collision pairs only one pair (when oxygen collides with hydrocarbon) results in a heat energy gain.

Too Lean, Too Fat, or Just Right?

Now let us state the known facts about flammable gas and air mixtures. They can exist in three conditions: 1. too lean to burn, 2. within the flammable limits, and 3. too rich to burn. In terms of our analogy, "1. too lean to burn" means: too few oxygen-hydrocarbon collisions to maintain the mixture at or above ignition temperature; "2. within the flammable limits" means: just the right proportion of oxygen-hydrocarbon collisions to maintain the mixture at or above ignition temperature, and "3. too rich to burn" means: too many non-energy-releasing hydrocarbon-hydrocarbon collisions and too few oxygen-hydrocarbon collisions to maintain the mixture at ignition temperature.

From tables of flammable explosive limits we know that one vapor unit of gasoline must be mixed with from 12 to 70 units of air in order to burn as flame. This means, in the approximate terms of our diagram, that one gasoline vapor hydrocarbon molecule must have available the oxygen molecules in at least 12 units of air with which to collide. But, while it gets 12 oxygen units for 12 units of air, it also gets 48 inert gas units in the same amount of air. In other words, as the number of oxygen-hydrocarbon collision possibilities increase, the hydrocarbon-inert gas collision possibilities increase approximately four times as fast. The active oxygen as supplied in air is already diluted with nearly four times as many inert molecules. We should note also that the available heat energy gained in oxygen-hydrocarbon collisions spreads throughout the mixture by inter-molecular collisions and by radiation (as radiant heat) travelling with the speed of light.

When we recognize that only the oxygen-hydrocarbon collisions produce an available energy gain it becomes evident why mixing is an important factor in all flame propagation. In thousands of flame column tests, conducted in the Grinnell Fire Control Research Laboratories by the late Robert Cranston, it required something more to produce flame than merely having the right proportions of flammable vapor and air in the flame column. The air and vapors ***had to be mixed before ignition***, if flame was to travel up the column. Proportions of flammable vapor and air known to be within the flammable limits would not ignite or burn until mixing had taken place. After mixing, the same ingredients would produce a flame cap, starting at the spark electrodes in the base and travelling upward to the top of the column. In molecular terms: in the unmixed vapors only hydrocarbon-hydrocarbon or hydrocarbon-inert collisions were taking place; while in the air-filled portions of the column only oxygen-oxygen, inert gas-inert gas and oxygen-inert gas collisions were taking place. After mixing, oxygen-hydrocarbon collisions became mechanically possible in sufficient number to propagate the flame from the bottom to the top of the column.

A commonplace example of the necessity for mixing is the burning of a tank of medium or heavy fuel oil or automobile crankcase oil in the open air. After the oil is ignited, the flame above the oil supplies the input heat to maintain a supply of hydrocarbon molecules, the surrounding air provides more than enough available oxygen to unite with the hydrocarbon molecules, the flame provides a source of continuing ignition . . . and yet we will usually observe a column of black smoke rising from such a fire. This can be explained by assuming that near the center of the vapor column rising from the heated oil mostly hydrocarbon-hydrocarbon

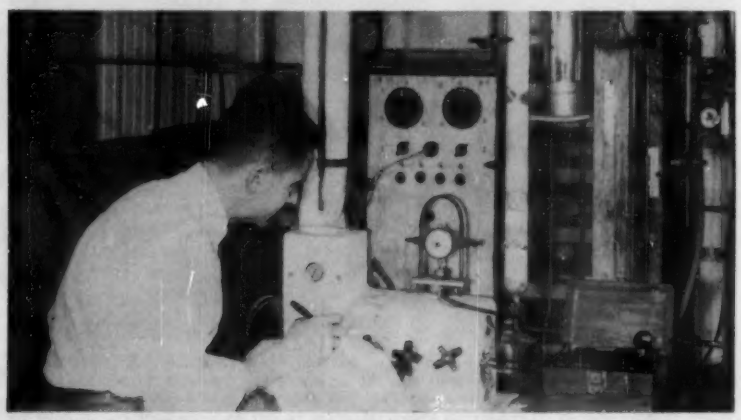

Fig. 6. Flame column tests show water vapor needed to make gas mixture too lean to burn.

collisions are taking place. Thus, the excess of hydrocarbon vapors, which fail to mix with air above the fire, escape beyond the ignition range of the flames before a flammable proportion and mixing with air occurs.

"Clean" and Sooty Burning

Taking number 3 fuel oil as an example, we can see it all burning with a clear flame, without sooting, in any properly adjusted gun-type oil burner, such as we use in our homes. The gun-type burner when properly adjusted, mechanically atomizes the oil, mixes the vapors with air in the proper proportions and supplies an electric spark as a source of ignition. Result: a clean burning flame with practically no sooting inside the furnace, yet this is the same oil which will give us a sooty black column of smoke above the fire when we burn it in the open without the gun-type burner's special mechanical provisions for thorough mixing and proportioning.

Whether or not thorough mixing occurs explains the phenomena of "*near burning*" or "*remote burning*" of distilled flammable vapors. When a wood fire is just starting in a fireplace or a campfire, the flammable vapors distilled from the wood burn as flame near the wood from which they are being distilled. This is "*near burning.*" After the fire is going good the addition of more dry fuel results in the excessive distillation of vapors which do not complete the necessary proportioning and mixing for burning as flame until they are several inches or even many feet above where they are distilled from the wood. In this situation we observe high flames and "*remote burning.*"

This phenomenon of "*remote burning*" is of interest to the fire protection engineer because it explains those commonly observed phenomena the so-called "hot air explosion" and the so-called "back-draft" which firemen fear. It also explains the remote breaking out of fire in attics from a fire which may start in the basement or a lower floor.

We have a plausible explanation of such occurrences if we assume that excessive amounts of flammable vapors and gases are being distilled off at the place of origin of the fire. Being hot, they travel upward through a partition or up an elevator well. The turbulence of their flow and their movement into areas where there is additional air promotes mixing with that air to produce a flammable mixture. When any part of the entire volume of mixed flammable gases or vapors and air is at or above the auto-ignition temperature for that mixture, flame propagation is to be expected. If the flame propagation is fast enough it will be called a "hot air explosion." If it is less violent, but produces enough heat to distill off flammable vapors from wooden beams or other flammable material in the attic, experienced firemen will track it down and fight it as a remote attic fire. All firemen are usually trained to expect and to look for such fires in private homes, tenements and apartment houses.

The back draft which firemen fear, occurs when they break in the door or window of a room which is filled with hot flammable gases and vapors in a mixture too rich to burn. The blending with outside air provides the supply of oxygen necessary to form a flammable mixture. A searing puff of flame blows back into the faces of the firemen.

Big-Inch "Fire" Line

"*Remote burning*" gases and vapors may be likened to manufactured or natural gas which may travel miles or thousands of miles in a condition in which only hydrocarbon-hydrocarbon collisions are possible. Under these conditions, gas from Texas travels all the way to New England where it is proportioned, mixed and ignited to burn in gas stoves. In the same way we can envision gases and vapors in a heated mixture, too rich to burn, traveling upward through ducts formed by partitions and studding, becoming proportioned and mixed with the air in an attic and, being

Fig. 4. Remote-burning gases sear ceiling panel before automatic sprinklers open.

Fig. 5. Under water spray, only sheltered gas-fed torch still burns its vapors.

above its auto-ignition temperature, bursting into flame in that remote location.

Ignition continuity, the sixth factor in our picture of the life cycle of fire, is explained by the velocity of travel necessary to bring about union between hydrocarbon and oxygen molecules when they collide in a mixture whose proportions are within the flammable limits. Auto-ignition temperature is a commonplace expression in fire protection language. When we refer to the classical theory of gases we find that we can substitute the words "*molecular velocity*" for temperature (the molecular velocity varies with the absolute temperature, and, knowing either, the other can be calculated). Making this substitution we can talk about the auto-ignition velocity necessary, in collisions between hydrocarbon and oxygen molecules, to produce flame. We can also point out a way of preventing flammable mixtures of air and gas from burning by simply reducing their molecular velocities to some point below the velocity necessary for continuing ignition.

In the ordinary fire, if the flame (which is the source of both input-heat and continuous ignition) can be interrupted long enough to break the cycle, the fire is extinguished by interruption of the self-perpetuating fire cycle. A commonplace example of this technique is extinguishing fire at oil or gas wells by the use of explosives. The area around the well is usually wet down by watering carts and hoses to eliminate sources of re-ignition. The discharge of the explosive momentarily interrupts the downward travel of the flame in the gas-and-air mixture above the well. This momentary interruption of ignition continuity has resulted in the successful extinguishment of thousands of oil and gas well fires. And, even though flammable mixtures of gas and air above the well are produced seconds later, the fire does not resume unless re-ignited.

Having outlined the life cycle of fire in relation to the six factors (input-heat, fuel, oxygen from air, proportioning, mixing and ignition continuity) which help us to understand the mechanics of fire in Class A materials, let us look at some significant recent advances in fire control and extinguishment and note their relationships to these factors.

New Distribution Patterns

The most radical recent improvement in fire control and extinguishment is the industry-wide adoption of a new distribution pattern for the spray from automatic sprinklers and the abandonment of the idea that sprinklers must wet ceilings in order to protect them. Understanding the sound basis for the improved performance obtained with this new distribution pattern calls, first, for an understanding of the roles of input-heat and of water vapor which dilutes the active flammable vapor and oxygen mixtures with non-flammable constituents.

Ceiling protection against burn-through requires only that the flammable materials in the ceiling be protected against temperatures at which flammable vapors or gases will be distilled from them. The input-heat which raises the ceiling to distillation temperature comes from the flame of the fire beneath it. The most dramatic difference measured in fire tests at the Factory Mutual Research Laboratories and at the proving ground of Grinnell Fire Control Research Laboratories, which I have witnessed, is the instantaneous lowering of ceiling temperatures below the distillation temperature of wood when the first spray sprinkler opens. The wide horizontal spread of spray knocks down ceiling temperatures from 1,000°F to around 500°F—a temperature at which few ceiling materials will distill off sufficient flammable vapors to maintain a flame.

A close second in interest is the fast knock-down of flame in gases burning remotely from the fire. Let us consider as "remote burning" all vapors which burn at a distance greater than a few inches from the places where they are distilled off. "Near-burning" gases are those ig-

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nited near enough to the material being distilled to contribute an appreciable amount of input-heat for the distillation of more vapors from the same materials. We then recognize that the high flames which reach the ceiling are nearly always remote burning. As soon as water spray reaches the Class A fire's materials, which are distilling off the remote burning vapors that lick the ceiling, in most cases the flames are seen to recede from the ceiling; and, within minutes few if any of the flames reach more than a foot above the materials in the fire. (See Figures 4 & 5.)

In everyday language this knockdown of remote burning gases is attributed to "smothering" by the water vapor or steam released when water strikes the burning embers of the fire. If, however, we consider this phenomenon in the light of what the kinetic theory of gases has to teach us, we get a more informative picture of what is actually occurring. Since any flammable mixture of gases and air is made up of both active (hydrocarbon and oxygen) molecules and inactive inert gas (principally nitrogen) molecules, it is easy to see that the addition of an abundant supply of inert water vapor molecules dilutes the active molecules. This superabundance of inert molecules greatly decreases the chances of the oxygen-hydrocarbon collisions which release heat energy and maintain the flame.

The kinetic theory of gases also tells us to expect another effect which is readily observed. We know that when we mix two or more gases or vapors they all come quickly to the same temperature. Thus, when we add water vapor, at a lower temperature, we know that the final temperature of the mixture will be lower than that of the mixture before the water vapor was added. The addition of water vapor lowers the kinetic energies and velocities of the active molecules. As soon as the velocities of the active molecules are reduced below their auto-ignition velocities, chemical combination (with the resultant release of heat energy) is not to be expected, even though collisions between active oxygen and active hydrocarbon continue to occur. (Figure 6)

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This detailed analysis shows us that we have two effects contributing to the knockdown of flames in remote burning gases above a fire: 1. Dilution of the active molecules in the air-vapor mixture by inert water vapor, thereby reducing the number of possible collisions between active molecules, and 2. Reduction of the velocities involved in collisions between active molecules in the mixture. The importance of dilution can be appreciated when it is remembered that a drop of water turned into steam occupies approximately 1,650 times its original liquid volume. The temperature of steam is still below the auto-ignition temperature of most flammable vapor-air mixtures.

Combination of Water

At the same time that dilution and cooling are occurring in the remote burning gases from the fire, the vaporization of water at the surface of the burning embers is removing input-heat from the materials which are distilling off flammable vapors or gases, thus diminishing the fuel supply.

Water spray, then, attacks fire in three ways: by cooling the embers giving off flammable vapors to reduce and cut off the supply of fuel, by diluting of the fuel and oxygen in fuel-air-water vapor mixtures, and by cooling the fuel-air mixture below its ignition temperature.

The quick knock-down of remote burning flame when a spray sprinkler opens up on a Class A fire can be simulated in a fireplace or open bonfire by using green wood, which contains a high percentage of water, as new fuel for the fire. A fire which is sending up high flames can be turned into a low fire, with no remote burning flames, simply by piling on enough green wood. Input-heat penetrating green wood is used up in distilling off water vapor in such quantities as to interfere with both the near-burning and remote-burning of the distilled vapors. The water in the wood comes out as

water vapor at temperatures up to 212°F, whereas higher temperatures are generally required for the distillation of flammable vapors or gases. The same actions of water vapor occur here as when a spray is applied to the outside of wood, the water in this case coming from inside. Many a sportsman has killed a good fire by letting water vapor from green wood dilute and cool the vapors and gases which were burning as flame in his campfire.

From this picture of the life cycle of fire and its extinguishment by water spray, it may be seen that in appraising potential fire situations first consideration must be given to the ease with which a so-called "flammable material" can distill vapors which will burn as flame. Just as an example, the ease with which industrial oils are turned to flammable vapors, whose flames provide input-heat to distill off more flammable vapors, contributed largely to America's largest single industrial fire loss in 1953. The input-heat from what started as a small fire in the Livonia Plant of the General Motors Company, finding abundant "flammable material" as it spread through the acres of plant space, not only distilled off all available vapors but was sufficient to weaken and collapse the steel structure. Wherever such materials are used or stored they deserve to be evaluated for their BTU content in case they take fire and become a source of input-heat for further spread of fire.

It is hoped that this description of the mechanics of fire and of water's role in extinguishment will lead to a better understanding of the practical use of water spray as a protector of lives and property.

Pictures by courtesy of Grinnell Company, Inc.

Fire Problems—
(Continued from page 55)

Russell C. Nye, administrator of the Northwestern Hospital, Minneapolis, Minnesota, outlined the "Fire and Evacuation" plan developed by his hospital over the past nine years.

Evolved by an employee-management committee working with the city fire prevention bureau and an insurance safety consultant, the three essential elements of the plan, he said, were: 1—a warning system; 2—an evacuation (movement of patients) plan; and 3—training for disciplined group action. But, he warned, all such plans are only "as good as the people upon whom they depend.

"We try to be sure that each employee understands the fire orders and help him to realize that not only many lives depend upon him, but, perhaps even his own life may depend upon complete understanding of his individual responsibility and assignment."

Following Mr. Nye, chief engineer W. G. Schultz of a leading insurance company, termed lumber yards modern-day "conflagration breeders." He told how fires originating in lumber yards too often have spread to adjacent homes and buildings and resulted in the destruction of entire communities. However, he cautioned against placing the whole blame for such destruction on the lumber dealers.

"The community itself is often responsible," he said, explaining that many lumber yards, once sensibly located on the outskirts of town away from other property, are now entirely hemmed in by dwellings and other buildings as the result of the town's shortsighted expansion.

He listed the basic fire protection measures that every lumber dealer should observe. But for the real solution to the serious threat of lumber fires to every community, he added, "both the lumber dealers and the city fathers should get their heads together before it is too late."

Flammable Fabrics Control

On another aspect of fire's threat to community well-being, a fire protection engineer revealed that the principal victims of flammable clothing fires are children. Arthur Spiegelman, senior research engineer of the National Board of Fire Underwriters, told the meeting that public concern over dangerously flammable wearing apparel has grown steadily over the past ten years.

"The series of fatal accidents involving little boys in cowboy costumes and the thousands of 'torch' sweaters which appeared on the market in 1949," he said, "were instrumental in focussing interest on the necessity for adequate safety regulation of the type of textiles which are used for wearing apparel."

One result, Mr. Spiegelman pointed out, was the passage of the "Flammable Fabrics Act," effective last July 1, 1954, which provides for the testing and restricting of those textiles in the "rapid and intense" burning class.

He added that the act represents "the first passage of federal legislation to protect the public from the hazards of fire."

As a next step, he called for the gathering of more "factual data to better indicate where and in which materials the hazard exists."

Fire, too, is an ever-present threat to this country's 2.3 billion dollar cotton industry, a fire protection engineer reported. The head of the Fire Prevention and Engineering Bureau of Texas, A. Sidney Briggs, described the fire hazards confronting cotton from its initial ginning on through its transportation and storage.

He revealed that, contrary to former beliefs, recent tests have "practically proven" that cotton gin fires are caused by friction rather than static sparks igniting the cotton. Friction has also been found to be the principal cause of cotton transit fires, he said, and added that railroads are particularly concerned, having experienced losses of nearly 2 million dollars last year from cotton fires.

A third area in which fire has become an increasingly serious problem according to Mr. Briggs, is the storage and reconditioning of baled cotton.

Here, he said, nearly impossible fire protection demands, huge concentrations of value, and new and unfamiliar fire hazards require our "early attention before harmful practices are permanently adopted."

transportation safety

NEW SAFETY FLARE

A HIGHWAY SAFETY item long used by truck drivers has been redesigned to provide a flare for passenger car use. Standard equipment for many years with interstate truckers, the warning device has been modified so that it can be stored compactly in glove compartments.

Visible Half-Mile Away

The bright red reflector of "Lucite" acrylic resin can be seen more than half a mile away by approaching motorists. During the day, the red flag is an added safety factor. The device is aimed at reducing the number of "sitting duck" accidents to drivers and passengers of stalled or disabled cars. It is estimated that during 1954 over 41 million disabled vehicles were stalled along the nation's highways.

For complete details, use Key No. TS–17 on free inquiry card on page 71.

How Do YOU Look At An Accident?

These problems test your ability to judge accident responsibility based on modern defensive driving techniques. They have been devised by Donald S. Buck, safety director, U. S. Army Transportation Corps. Assume that each report is based on a true accident; that each driver's statement is true and complete as given. Decide in each case whether the driver caused the accident or was victim. Remember that you are not deciding who is at fault, but determining who helped to cause the accident.

Case No. 5—Driver's Statement

"It was dark. I was driving along the highway, when I met a vehicle with blinding headlights coming toward me. The other driver refused to dim his lights, and it was impossible to see where I was going, so I ran off the road on the right side and upset. This accident was caused by blinding headlights. If the other guy had dimmed, the accident would not have happened. This other fellow didn't even stop, so I don't know who forced me off the road. Luckily, a car following me stopped to help. This driver backed up my story on the blinding headlights."

Case No. 6—Driver's Statement

"I was driving on the highway, when an old 'jalopy' driven by some local yokel, suddenly pulled out of a side road directly into my path. I applied my brakes and cut my wheel sharply, trying to pass behind him, but my steering gear failed, and my vehicle crabbed around and skidded into this old wreck. I guess my tie rod must have broken, because no matter what I did with the steering wheel, the car would not respond. Luckily my skid marks showed all brakes held all the way, so my steering gear was out of whack!"

Answers are on page 66

How's Your Posture At the Wheel?

SAFETY EXPERTS are finding good posture has a marked application to the problem of both truck and car drivers," says Healthways, a publication of the National Chiropractic Association. "The many injunctions to sit tall, stand tall and walk tall, which are part of the basic public service of chiropractic, have been found by safety experts to have a definite effect towards minimizing the effects of fatigue, with its attendant hazards."

Good posture behind the wheel means driving longer without weariness, and maintaining a wider safety margin. Motorists should be warned against the tendency to slump after a few miles of driving. Back and shoulder muscles have to take the burden which the spine was designed by nature to assume. The result is both nervous and muscular fatigue.

Sitting too near or too far from the steering mechanism creates tensions which tire the coordinating and manipulative muscles quickly, and "tucking the wheel into the midriff" and "sitting sidewise" are

exhausting and therefore tend to create accidents.

With proper posture behind the wheel, the driver has a clear view of the road and maintains maximum use and control of the body. For this the driver should seat himself behind the wheel as he normally sits in a chair. Adjust the seat so that forearms are about parallel with the plane of the wheel. Get the legs in a comfortable position so they can operate the foot pedals easily.

Windshield Research

SAFER, ICE-FREE aircraft windshields now are being built as the result of a 4½-year research program concluded recently at Armour Research Foundation of Illinois Institute of Technology, Chicago.

The project was sponsored by the Wright Air Development center, Dayton, Ohio, so designers could specify failure-proof windshields that would never shatter, but only crack under the worst military and climatic conditions.

Two of several important developments were:

1. A system was developed for measuring over-all optical quality of windshields as they were affected by imposed laboratory conditions. The system employs a rectifying plate that corrects for distortion directly, thus eliminating mathematical corrective calculation after test photographs are made.

2. A windshield mounting employing a synthetic fiber cloth was developed. The fiber, replacing aluminum in some applications, improved stress isolation of the windshield, necessary in conditions of intense airframe distortion and vibration.

Most of the research was undertaken to find a pressure-proof, distortion-free, anti-icing windshield that would be satisfactory for global operation. One experiment sought to keep the temperature on the outer surface of the windshield at about 40 degrees F. to prevent ice from forming.

In others, the Armour Research Foundation scientists had to consider air friction, evaporation, thermostatic arrangements for controlling the heat, stresses, and other complex factors.

Safety also entered the picture in the case of pressurized cabins or cockpits.

Experimental models were subjected to low temperatures, thermal shocks such as might be encountered in flying into a super-cooled cloud, stresses caused by the heat input in de-icing, more stresses induced by cabin pressurization—still others due to airframe distortion, speed, or air gusts.

Traffic Engineers Meeting

THE SILVER ANNIVERSARY meeting of the Institute of Traffic Engineers will be held from October 23 to 27 at the William Penn Hotel in Pittsburgh, Pa. The first meeting of the Institute was held at the same place on October 2, 1930.

Turnpike Cuts Accidents

NEW RECORDS in traffic volume, together with further sharp improvement in its safety record, highlighted the annual report of the New Jersey Turnpike in 1954.

A total of 24,705,851 vehicles moved over the Turnpike last year, a daily average of 67,687. This daily average would compare with the engineers' estimate of traffic for 1954 of 27,700 vehicles.

Significant improvement was made in the safety record. The accident, injury and fatality rates were at the lowest levels since the Turnpike opened in November, 1951. Accidents in 1954 totaled 550 and were at the rate of 59.2 for each 100 million miles of vehicle travel. That was about one-seventh the rate on New Jersey's public highways and a mere fraction of the rate on the nation's highways as a whole.

Noteworthy were the reductions in injuries and fatalities. These were down by 20.3 and 36.1 percent, respectively, compared with 1953. There were 23 deaths caused by fatal accidents in 1954 of which 10, or 43.4 percent, involved single vehicles, and the remaining 13 were caused by rear-end, or other, collisions.

Of particular significance is the fact that the fatality rate on the Turnpike for 1954 equaled 2.47 per 100 million vehicle miles, the lowest of any state in the nation (1953 figures the latest available). It compared with 6.2 on the nation's highways for the first eleven months of 1954.

"The achievement in safety last year," add the Commissioners, "can be attributed to the excellent cooperation of motorists and truckers using the facility, the rigid enforcement of traffic regulations by the State Police detachment assigned to the Turnpike, and the adoption and installation of additional safety measures. The Authority will continue to explore ways and means of maintaining the excellent record which has been established and strive to accomplish further improvements."

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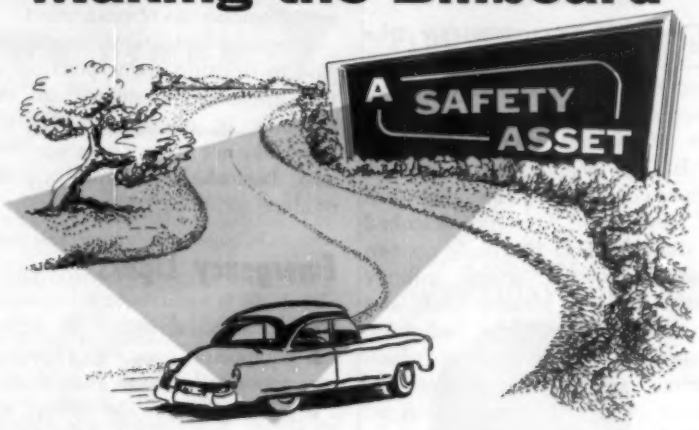
(For details, use Key # H-29 on card on page 71)

Making the Billboard



by LAWRENCE C. HOWE
L. C. Howe Safety Services

IT IS NOT the purpose of this article to examine and appraise the science and mechanics of road construction, the safety engineering of motor driven vehicles, or the complexities of problem facing traffic experts in their need to accommodate adequate vehicle use to inadequate streets and highways.

The fruition of their efforts, and the astronomical expenditures sure to be involved, still cannot produce the totally accident-free highway we all desire, ***unless safe driving is thoroughly and constructively sold at the most important point of contact:*** that is, on the highway where the driver is behind the wheel going somewhere.

A deathless highway can be achieved by beginning now to apply the proven safety education methods successfully used in industry to reduce accident frequency and severity rates. Here safety is fostered by consistent programs of on-the-job training and safety-selling through visual means. These procedures have established safety consciousness on the part of the individual which has rendered most plants using them safer than the home in which the individual lives or the street on which he walks or rides to work.

Simply by the use of sound sales techniques, in which the positive —never the negative—approach to safety is used, industrial workers are thoroughly sold on the idea. Moreover, an active and positive state of mind with respect to safety is created and maintained because the process of convincing safety-selling is a continuous one. It is carried out by colorful lighted displays and bulletin board posters bearing constant but acceptable reminders to work safely. A single safety idea is projected throughout a given plant at one time in short, readable, and fully comprehensible display messages. Besides building attitudes, these serve as constant reminders with amazing results.

Highway safety education through display had its humble if somewhat startling beginning with the White Cross that marked the spot of a fatal accident in Ohio many years ago. Its progress has been considerably slower than its seriousness warrants. It has been manifested quite notably through highway marking, curve signs, and warning signals adopted on most state and federal through highways, and is evidenced particularly in recent years, by traffic safety sign programs instituted by the police departments of a number of cities.

The truly safe highway, however, will be that modern, well designed and safely constructed strip on which the most advanced and proven methods of safety selling will be utilized. In terms of the motorist, on-the-job safety training means "at-the-wheel training" for as many who travel the highways as possible. It must incorporate widespread and efficient person-to-person instruction as now couducted by many public schools, automobile dealers, and other driver training agencies. It must include all other usual means by which, once a driver, one gains the immeasurable value of driving experience.

But, more than this is needed. Constant at-the-wheel training for even the most experienced motorist is a "must" to accomplish maximum safety results. Safe conduct behind the wheel of an automobile is a matter of safety thinking and awareness, and requires industry's safety repeat-selling technique.

Plant safety is a matter of complete statistical record with comparative data available for study and analysis. The same is generally true of highway safety data and much can be made of it in planning and programming the measures needed for tomorrow's safe highways. Because the solution is necessarily a long term endeavor, the start must be made forthwith by developing statistical records for designated stretches of highway in test areas for purposes of study.

Twenty-mile strips carrying fairly heavy traffic will be most desirable for this purpose, with safety-selling installations designed specifically for each. Location and appearance of the installations will be such as to enhance scenic values and at the same time bring to bear the at-the-wheel point of contact, the steady and beneficial influence of positive safety thinking.

Such tests should be instituted now, preferably by local, state and federal governments or suitable foundations. They would most certainly evolve into a nationwide pattern of at-the-wheel safety programming of immeasurable value, conceivably a further development and refinement of the present universal highway marking system.

Replacement of the distracting private selling billboards now along many highways with numbers of solid-selling safety displays could do much to bring down our highway death toll.

Safety Influences

ENGINEERS GATHERED for the spring meeting of the American Society of Mechanical Engineers heard a discussion of methods for influencing driver safety. Jesse Orlansky, vice president of the Stamford, Conn., consulting firm of Dunlap and Associates described a study his firm has made on two major highways, several military bases, traffic on country roads, and a number of different industries. Experiments were run in which various influences on accident behavior were set up: stop signs, patrol cars, and even a policeman pretending to write out a ticket to an offending motorist. Dr. Orlansky, who is a graduate psychologist, said that all of these measures produced immediate results in terms of increased safety, but that none of them was effective beyond two days.

The speaker listed four steps for a solution of America's highway toll of accidents:

1. Consistent and complete safety records should be kept.

2. These records must be evaluated by proper statistical methods which will permit us to interpret these data in terms of their rate (number of people involved, man hours, car miles, etc.) and variability (the number of cases on which they are based).

3. A conscious effort should be made to determine the effectiveness of aspects of the safety program, since it appears likely that some phases of current safety programs produce no obvious effect.

4. Special attention should be paid to studying undue practices as well as accidents, since there are elements in any safety program which do not show up as accident data, but which probably help to produce accidents.

Emergency Lights

THE AVERAGE person is better equipped to cope with a lighting emergency in his home than during a nighttime automobile mishap, according to a survey of the nation's emergency lighting equipment. In reporting results of the survey, Rodman St. Clair, general manager of the Electrical Division of Olin Mathieson Chemical Corporation, pointed out that half the motoring public carries no electrical emergency lighting equipment in their automobiles.

The survey was made in Kansas City, Mo. Nearly every resident (86.8 percent) has a flashlight in his home while only 51.6 percent carried them in their automobiles. The survey also found that only 58.7 percent of the population were confident their flashlights would light. The lack of concern in whether a flashlight might give light during an automobile or home emergency was shown by the fact that 53.4 percent of those queried hadn't tested their flashlights in a month.

An automobile emergency flash light or lantern should be capable of projecting a beam at least 700 feet. If a flashlight is used, Mr. St. Clair said, it should fit into a glove compartment. If a lantern is used, it should be attached to the cowl under the dashboard. A driver, stalled on a dark road, should not step out of his car without a hand light, he emphasized. Two extra batteries, or the number required for the emergency light, should be kept in the glove compartment.

Scholarships in Driver Education

ANOTHER IMPORTANT industry has come to the foreground in providing financial grants for training leaders in traffic safety. This is the Esso Safety Foundation, that had previously given grants to the Center for Safety Education at New York University for training driver educators, to the Yale University Bureau for Highway Traffic for training engineers, and to Northeastern University for courses for police and traffic court magistrates.

The foundation has recently added another grant of $15,000, to be divided among six colleges located in states in which the company operates. According to Dr. Herbert J. Stack, Director, this will provide for 145 scholarships of from $70 to $100 to high-school and college teachers of driver education to enroll in 60-hour intensive two-week training courses in driver education.

The co-operating colleges to be selected will be for the most part private institutions, in conformity with industry's desire to support private colleges. The six colleges will be located in regional centers so that travel expenses for students in the Esso states will not be high.

The New York University course for high-school teachers were held from June 6 to 18; for college teachers, from June 20 to July 1. Courses at other colleges will be announced as soon as arrangements are completed.

Answers to "How Do You Look at an Accident" on page 63

Now that you have passed judgment on these accidents, let's review the answer to see how well you made out. Don't be disturbed if you didn't get a perfect score. Very few safety men have! Each case should have been scored as a "preventable" accident.

5. Caused by our driver. The claim of being blinded by headlights is an admission that the driver was not properly using his eyes. By looking at the right edge of the road well beyond the oncoming vehicle, our driver could have offset the blinding effect of glaring headlights. When meeting blinding headlights, our driver should also slow down, so that he can retain control of his vehicle. Then by following the technique of riveting his eyes on a point to the right of the pavement and well beyond the oncoming vehicle, he will have no difficulty in meeting the blinding headlights, yet is able to keep cognizant of the oncoming vehicle out of the "tail of his eye."

6. Caused by our driver. Again the impulsive application of brakes erased any advantage to be derived from cutting the steering wheel. When the tires are sliding, the vehicle will faithfully follow the line of least resistance, which is usually a straight line.

inside the trade

John B. Davies, manager of industrial sales, *MINE SAFETY APPLIANCES COMPANY*, Pittsburgh, was elected president of the Industrial Safety Equipment Association at the group's recent annual meeting.

Mr. Davies, a graduate of Carnegie Institute of Technology, joined Mine Safety as a chemist in 1919, five years after the company was founded. Before assuming his present position, Mr. Davies was assistant sales manager. He is a member of the American Society of Safety Engineers, the American Industrial Hygiene Association, and the International Association of Fire Chiefs. He is a past president of the Veterans of Safety and a director of National Sales Executives, Inc.

ALAN WOOD STEEL COMPANY has purchased the Steel Equipment Division of Penn Metal Corporation of Penna. This division, which manufactures steel lockers, cabinets and shelving under the trade name "Penco", will be operated as the Penco Metal Products Division of Alan Wood Steel Company.

The purchase includes land, buildings, machinery and inventory. The division will continue operations in its present location at Oregon Avenue and Swanson Street, Philadelphia.

NUTTING TRUCK AND CASTER COMPANY, announces new warehousing facilities to serve users of materials handling equipment in the West Coast trade area. Located at 253 4th Street, Oakland 7, California, these new facilities include a complete stock of floor trucks, casters, wheels and replacement parts plus maintenance and repair service.

THE AMERICAN PULLEY COMPANY of Philadelphia has purchased from the Standard Pressed Steel Company of Jenkintown, Pennsylvania, the rights, tooling, equipment and inventory for the latter's line of pressed-steel platform trucks. By adding platform trucks to its Materials-Handling Division, American Pulley rounds out its line to include all types of manually operated materials-handling equipment.

Elmer F. Reske was elected President of the Society of Fire Protection Engineers at the Society's annual meeting. Mr. Reske is Manager of the Cook County Inspection Bureau, Chicago, Ill. Other officers elected at this meeting were First Vice-President, *William G. Schultz*, Chief Engineer and Assistant Vice-President, Lumbermens Mutual Insurance Co., Mansfield, Ohio; Second Vice-President, *James J. Duggan*, Superintendent of Mechanical and Fire Safety, Carbide and Carbon Chemicals Co., South Charleston, W. Va.; and Secretary-Treasurer, *Robert S. Moulton*, Technical Secretary, National Fire Protection Association, Boston, Mass.

THE HEWSON COMPANY, INC. announces the appointment of Mr. J. W. Wollett, 34 Sunnyfield Drive, R. D. 2., Bridgeville, Pennsylvania, as representative for sales, field application and servicing of its line of insulation test sets, static control systems, static alarm systems and automatic ground controls for West Virginia and western Pennsylvania.

BREUER ELECTRIC MFG. CO. has announced the appointment of *William R. McMillen* as Regional Sales Manager for the company in the southeastern United States. As in the past, he will headquarter in Atlanta and his territory will include Florida, Alabama, Georgia, North Carolina, South Carolina and Eastern Tennessee.

WHEELCO INSTRUMENTS DIVISION of the Barber-Colman Co. has announced the completion of a series of sales clinics. Extending over a four week period, the clinics appraised the expanding field of Automation, introduced new Wheelco Control products, and included a study of marketing problems and quotas. All of the branch office personnel from Wheelco's nation-wide Sales organization were in attendance.

Joe E. Tracey, of Denver, has been named Rocky Mountain Representative for the Industrial Products Division of the *PIONEER RUBBER COMPANY*, makers of industrial gloves. Pioneer officials stated that Mr. Tracey's appointment is the latest in a series designed to establish closer contact with distributors of gloves.

THE HAMMEL-DAHL COMPANY of Providence, R. I., manufacturers of automatic control equipment, announces the appointment of the MacGuire Instrument Company, 1200 Axtell Drive (Columbia), Cayce, South Carolina, as their new Sales and Service Representative in South Carolina, North Carolina and part of Virginia. *Mr. William J. MacGuire* is in active charge of the company's sales and service.

MINNESOTA MINING & MFG. CO. has announced the promotion of *Collin H. Alexander* to manager of research and development of the vapor coating group, reflective products division. This group developed 3M brand aluminum fabric finish which is used in garments as protection against extreme heat. Alexander, who joined the company in 1951, pre-

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(Use Key # H-30 on Inquiry Card on page 71)

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(Use Key # H-31 on Inquiry Card on page 71)

viously was associated with Bausch and Lomb Optical Co. in the vapor coating field.

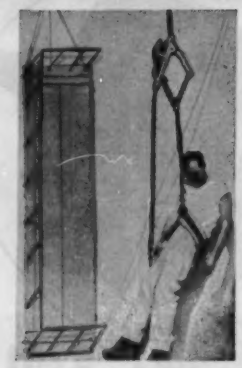
R. C. Coleman of Kansas City, Mo., long well known to the trucking industry, is now affiliated with "The Mid-West Truckman" magazine. One of the original founders of the *AMERICAN SAFETY TANK CO.*, he was granted leave of absence from 1942 until late 1945 to serve with the Office of Defense Transportation in Washington, D. C., and as Regional Director at Kansas City, Mo.

Mr. Coleman will continue to maintain his office at 3937 Main St., Kansas City, Mo. He expects to continue active in matters of safety and fire prevention for the trucking industry.

Glenn C. Vergne of Concord, Calif., has been appointed safety engineer of *TIDE WATER ASSOCIATED OIL COMPANY'S* Avon Flying A Refinery in Associated, Calif., it was announced by Oscar Larson, manager of the 1500 man refinery. Vergne succeeds Samuel O. Bacon, who has recently been promoted to safety engineer of the company's western division with headquarters in San Francisco.

Vergne has been with the oil company here since 1934. He was a foreman of the refinery's inspection department until his selection to be refinery safety engineer.

STOP THAT FALL



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Snaps into safety belt: No adjusting. Inexpensive. Overall length approx. 13". Does not harm rope. Weight: approx. 5 lbs.

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(Use Key # H-32 on Inquiry Card on page 71)

ELECTRONICS CORPORATION OF AMERICA, Cambridge, Mass., announces the formation of Electronics Corporation of America (Canada) Ltd., with headquarters at 98 Advance Road in Toronto. *Mr. James S. Carlile*, who has been supervising ECA sales activities in Canada, has been appointed as general manager of the Canadian subsidiary which will handle Canadian operations of the Photoswitch Division, Combustion Control Division and Fireye Division of ECA.

The new Corporation will render all possible assistance to presently established ECA distributors in Canada and is establishing complete service and repair facilities at its Toronto headquarters.

Earl Harrah, a veteran of 25 years of service, has been assigned to new duties with the *B. F. GOODRICH COMPANY* Tire & Equipment Division as field safety supervisor. Assigned to the field personnel department, he will be responsible for accident prevention, fire prevention, good housekeeping, and safety training at all field locations of the tire and equipment division.

Harrah began his career at BFG as a foreman in the industrial products division. He later served as a conference leader in the Akron training department, and prior to his present appointment, as a safety advisor in the safety department.

Safety & Fire Courses

THE FOLLOWING courses in the fall term, 1955, are announced by The Center for Safety Education at New York University: SC–1 Accident Prevention—Its Background, Objectives, and Relationships; SC–2 The Philosophy and Basic Principle of Accident Prevention; SC–3 Industrial Hazards—Mechanical and Personal: Control Methods; SC–8 Fire Prevention and Protection Inspection; SC–9 Accident Prevention for Operators of Motor Vehicle Fleets: Organizing the Program; SC–11 Vision Improvement in Industrial and Motor Vehicle Operators; SC–14 Principles of Safety Inspection; SC–17 Marine Accident Prevention; SC–18 Industrial Safety Technology and Instrumentation; SC–19 Hotel and Guest Safety; SC–20 Hospital Accident Prevention.

These courses begin during the week of September 26th. Bulletins may be secured by writing Dr. Walter A. Cutter, Center for Safety Education, Division of General Education, New York University, New York 3, New York.

The Safety Shelf—

(Continued from page 49)

Warehousing Accidents

THIS report contains a detailed analysis of injuries, injury rates, and hazards for the commercial warehousing industry. Included are analyses of: 1. Injury rates by type of warehouse, geographic region, state, and occupation; 2. Nature of injuries and parts of body injured; 3. Agencies involved in accident and types of accidents; and 4. Accident causes.

This publication is for sale at 40 cents per copy from the following regional offices of the Bureau of Labor Statistics: 341 Ninth Avenue, New York 1, N. Y.; 105 West Adams Street, Chicago 3, Illinois; 630 Sansome Street, San Francisco 11, California; or from Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Earthmoving Book

"MOVING THE EARTH" is the title of an informative reference book on excavation and earthmoving by Herbert L. Nichols, Jr. The 1280-page encyclopedia includes over 2500 drawings, photographs and tables. The author stresses care and safety and offers suggestions for reducing hazards.

This practical reference work is in two sections. The first deals with "The Work" and includes chapters on clearing, rough surveying, soil and mud, cellars, ditching and drainage, ponds, landscaping, roads, blasting and tunneling, pits, and financial management.

The second part, "The Machine," describes in detail practically every type of earthmoving equipment, with chapters on: basic information, revolving shovels, conveyor machinery, tractors and bulldozers, tractor loaders, scrapers, dump trucks, grading and compacting machinery, compressors and drills, and miscellaneous machines.

The volume is available for $15 from the publisher: North Castle Books, 212 Bedford Rd., Greenwich, Conn.

Material appearing in this section is published as information for our readers and is not intended to imply endorsement or guarantee by SAFETY MAINTENANCE.

What's New . . .

For your convenience in obtaining descriptive literature of products listed here, use the Reader's Inquiry Card. Just write in the code number given with each item. Or send written requests to:

Service Dept.,
SAFETY MAINTENANCE

FINGER FILM BADGE

(Use Key # 972 on Inquiry Card on page 71)

FINGER FILM BADGES for measuring routine exposure to the hands or fingers of personnel working with or near radioactive materials or X-Ray equipment are announced as a new service by R. S. Landauer, Jr. & Co. Badges are furnished at weekly intervals. At the end of each week those which have been used are returned for processing and analysis. A complete exposure report is then promptly sent to the user.

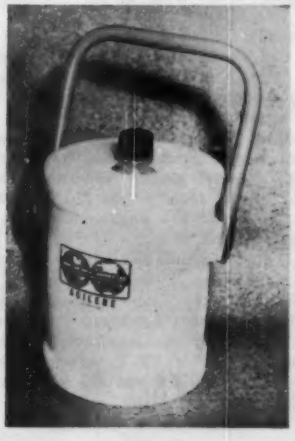
These badges are small, light, and water resistant. A flexible band makes possible nearly universal fit. The outer components and band are not reused thus preventing cross contamination. The unit is compact enough to be worn inside a rubber glove, where necessary.

PLASTIC BOTTLE-CARRIERS

(Use Key # 973 on Inquiry Card on page 71)

NEW SAFETY-TYPE bottle carriers fabricated entirely from polyethylene are announced by the American Agile Corp. These carriers protect acid or similarly-filled glass bottles or carboys from breakage. The unit shown is a standard model and holds a five-pint standard acid bottle. It is of welded construction with a centering ring which allows the bottle to be packed with ice or other coolerant and in addition, protects the bottle from shock.

Both impact capacity of the polyethylene material and the design of the carrier afford maximum protection to the container handled. Handles are strongly attached; and the top holds the mouth of the inner bottle in a centered position, even when pouring. In addition to its standard line of bottle carriers, units may be ordered according to individual specifications.

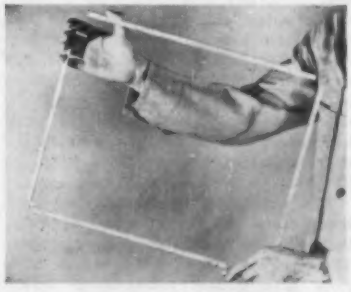


PORTABLE SAFETY BARRICADE

(Use Key # 974 on Inquiry Card on page 71)

STEEL SAFETY barricade features portability, light weight, and ease of assembly for all temporary detours, street repairs, marking danger areas, and protecting off-limits areas. Two folding "A" legs and a steel tubing cross bar lock together in a matter of seconds. Legs are held open positively by means of a patented locking device, and may be folded inside the bar for easy carrying or for compact storage.

Baked-on chrome yellow enamel finish assures high visibility at night or daytime for the E-Z Barricade. Safety signs may be hung on the cross bar for special warning situations. Made by Eastern Metal of Elmira, Inc., regular models have heights of over 3 ft. and are equipped with 4, 6, 8, and 10 foot cross bars, depending upon requirements. Regular 4 ft. model weighs only 11 pounds.



EXPLOSION-VENT PLASTIC WINDOWS

(Use Key # 975 on Inquiry Card on page 71)

EXPLOSION-VENT windows of extruded Tenite butyrate plastic are new aids to industrial plant safety. In the event of a blast caused by the sudden ignition of gas or air-borne dust, the flexible plastic panes will bow and pull away from the casings to effect a quick release of pressure. The tough panes, made by General Plastics Corp., will not shatter and thus eliminate the hazard of flying fragments.

The new glazing material is transparent and the panes are cut to size from extruded sheet. Thin galvanized strips are crimped over all four edges of the tough plastic panes, providing a metal binding ⅜" wide. The metal edge gives added rigidity, and also facilitates glazing since it provides a good surface for putty.

HAND CLEANER

(Use Key # 976 on Inquiry Card on page 71)

AVAILABLE FROM Amasa Laboratories, Inc. is a hand cleaner for use with or without water. It is claimed that "E-Z-Go" will remove grime, putty, gum, tar, grease, carbon black, paint, varnish, inks, roofing and caulking compounds, etc.

The hand cleaner is said to contain no ammonia, alkaline salts or abrasives. A special antiseptic and lanolin help prevent chapping and roughing of the skin. Available in either cream or liquid form.

BACK-SUPPORTING LINEMAN'S BELT

(Use Key # 977 on Inquiry Card on page 71)

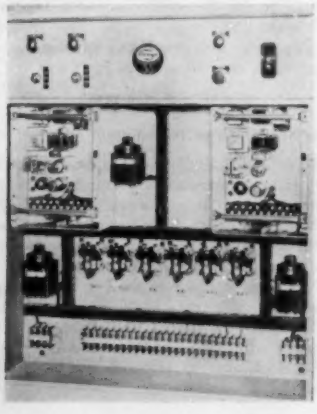
MILLER, well-known in lineman and industrial equipment fields for lifesaving equipment, has developed what it claims is the safest and most comfortable belt a lineman ever wore—the Miller Bak-Saver. Thoroughly tried and tested, this new belt eliminates the hazard of falling out of the saddle and therefore permits the lineman to be higher on his work. Because of this, he can now work further out from the pole with greater comfort and freedom.

This strong yet light-weight belt combines all of the protection of the safety belt with the comfort of a back support. The support portion of the belt is made from high quality russet strap leather and is ventilated for cool comfort. Tool saddle and dee saddle are made from russet steer harness leather for maximum strength. The design permits the belt to be worn in a low, comfortable position, firmly supports tool weight, and holds tool belt in proper position at all times.

BURNER CONTROL SYSTEM

(Use Key # 978 on Inquiry Card on page 71)

FIREYE INTEGRATED Control System is especially designed for safe lightup and operation of multiple-burner boilers. It consists of a prewired and tested Control Cabinet Assembly, as shown in the picture, plus all the necessary controls, timers, valves and accessories for a complete installation.



The system provides starting and operating flame-failure protection for one, two, three or four burners: gas, oil or gas-oil fired; manually or semi-automatically ignited. Flame failure protection is provided for each burner by two Fireye Type 48PT1 Scanners; one monitors the pilot flame and the other the main flame. The system does not allow the main fuel valve to open until the pilot flame is established. It makes mandatory a purge time of sufficient length to produce four air changes in the boiler, at the end of which time a green light flashes to show the operator he may continue the "light-off" procedure.

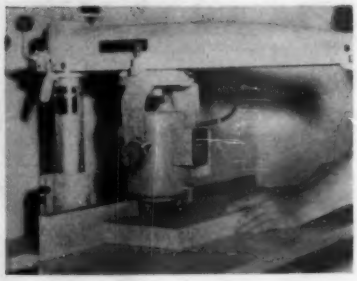
A timer limits the trial-for-ignition for each burner to ten seconds, after which time the fuel valve closes if main flame is not ignited. When a flame failure occurs at any burner during light-off or operation, an alarm-horn sounds and a red alarm light for that burner is illuminated. The alarm light remains on until the burner is restored to normal operation. A switch is provided for silencing the horn.

VARIED PRESSURE DRY CHEMICAL EXTINGUISHER

(Use Key # 979 on Inquiry Card on page 71)

A NEW 10-pound pressurized dry chemical fire extinguisher which carries Underwriters' approval for a pressure range of from 150 to 250 pounds has been announced by Walter Kidde & Company, Inc. The advantage of such a wide range of working pressures, according to Kidde engineers, is that the unit will work satisfactorily if only 150 pounds of air pressure is available. When pressurized to 250 pounds the extinguisher packs an extra hard hitting punch.

The unit features a pistol grip trigger release mechanism, a new dust and moisture-proof gauge which shows at a glance the unit's charged pressure. It also uses a diffuser horn which gives extra wide coverage of the discharge pattern for flammable liquid and electrical equipment fires.



SHAPER-JOINTER FENCE

(Use Key # 980 on Inquiry Card on page 71)

DEWALT INC., producers of woodworking equipment for industrial and homeshop applications, have introduced a new style jointer-shaper fence, replacing the standard wood guide when their radial-arm circular saw machine is to be used for shaping or jointing. With the motor in vertical position, and a shaper or jointer head attached to the spindle, the material is fed along the fence and through the cutting knives.

The height of the fence acts as a safety guard in protecting the operator from the moving parts of the machine which are positioned behind it. The long, rigid fence is supported at both ends, eliminating the possibility of "whip." Because the fence fits into the wood table top, there is an unusually large bearing surface for the stock.

FIRE RESISTANT HYDRAULIC FLUIDS

(Use Key # 981 on Inquiry Card on page 71)

TWO NEW fire-resistant hydraulic fluids engineered to meet special high and low viscosity requirements now are available in commercial quantities from Monsanto Chemical Company's Organic Chemicals Division.

The new fluids, trademarked Pydraul 150 and Pydraul 600, are reported to have the same fire-resistance, lubricity, non-toxicity and non-corrosiveness as the company's widely-accepted Pydraul F-9. They supplement the latter by providing different viscosities.

Pydraul 150, with a viscosity index of 170 and a pour point of –55 °F., is designed for use in outdoor installations, primarily within the steel industry, where systems are exposed to low ambient temperatures. Installed in an Askania regulator on a major steel company's blast furnace, the fluid recently proved self-extinguishing when broken lines poured 350 gallons of it into flames hot enough to melt the system's brass fittings.

At the opposite end of the viscosity range, the new Pydraul 600 has a viscosity index of 30 and a pour point of 15°F. Designed for presses, compressors and die-casting equipment, its S.U.S. viscosity of 625 at 100°F. compares with 220 for Pydraul F-9 and 150 for the new Pydraul 150.

(Continued on page 73)

FREE BULLETINS & CATALOGS

As a convenience to executives, these new publications of manufacturers are offered by the Reader Service Department of SAFETY MAINTENANCE & PRODUCTION. To obtain copies write in the key numbers on the free-postage card below.

MISCELLANEOUS

Signs for Safety 345
Ready Made Sign Co. New 48-page catalog illustrates in five colors a wide variety of industrial, commercial and highway safety signs, made in accordance with the A.S.A. code. Catalog is well indexed by subject.

Electrical Control System 346
Security Controls, Inc. This illustrated bulletin describes an electrical control system for predetermined repeat or non-repeat cycle on presses or other machines with a mechanical tripping mechanism.

Machine Eye Shield 347
Juntin Safety Appliance Co. Illustrated bulletin describes illuminated or non-illuminated eye shields for use on pedestal and bench grinders. Points out that the shields are completely adjustable.

Flexible Pipe Connections 348
T. R. Finn & Co., Inc. Complete line of flexible pipe connections to solve vibration and expansion problems in industrial and process piping is shown in this 12-page catalog, which gives pressure and temperature ranges, dimensions, specifications, selection factors, and installation procedures.

Electrical & Lubricating Devices. 349
Trico Fuse Mfg. Co. An 8-page condensed catalog offers electrical fuses, fuse pullers, reducers, test & fuse clip clamps. The lubricating section includes a wide variety of automatic oiling devices for machinery.

Flame Retardant 350
Grasselli Chemicals Div., E. I. duPont de Nemours & Co., Inc. An informative 16-page booklet gives product data on "X-12" flame retardant for use on fabrics and paper. Contents includes outline of the chemical's physical characteristics, uses, general procedures, applications, testing of treated materials, etc.

Ammonia Detecting Paper 351
Allied Chemical & Dye Corp. A free pocket-size booklet of paper strips for locating ammonia leaks. The paper is treated with phenophthalein. Dampened with water, the strips turn red in the presence of ammonia.

Asbestos Textiles 352
Johns-Manville. This illustrated 16-page manual is primarily for designers and purchasing agents in concerns utilizing asbestos textiles in their products. It covers cloth, yarn, lap, roving, tubing, cord, wick, rope and tape.

Cold Immersion Solvent 353
Curran Corp. A self-emulsifying and self-scouring solvent for decarbonizing engines and components is described in this 2-page bulletin. Gives full data on function and uses of the cold immersion solvent, methods of use, and precautions.

MAIL POSTAGE PAID CARD FOR MORE DATA

Safety Trim-Board 354
Zeus Rolcut Co. Well-illustrated 4-page folder describes a paper and film trimming board that utilizes a fully enclosed, circular-wheel cutting blade instead of a chopper blade. Shows safety features for offices, drafting rooms, printing and industrial uses.

PERSONAL PROTECTION

Non-Fog Lens Tissues 355
Cartoff Co. A 4-page bulletin, illustrated, describes cleaning tissues that are chemically treated to clean lenses and windshields and make them fog-proof. Bulletin also shows inexpensive brackets for mounting a carton of tissues and water-spray bottle.

Gloves and Garments 356
Syracuse-Eldridge Co., Inc. Very well illustrated catlog of 12 pages shows a line of protective clothing made from leather and asbestos. Includes several styles of welders' gloves, sleeves, aprons, jackets, spats; heavy, general and special duty gloves and hand protectors; and also coated and canvas gloves.

Self-Contained Respirators 357
Mine Safety Appliances Co. This 4-page bulletin illustrates and describes an approved self-contained breathing apparatus for either oxygen or air. Bulletin outlines features of the equipment and details its uses.

Insulated Safety Shoes 358
Record Industrial Co. Illustrated bulletin features an insulated safety shoe to keep feet warm, dry and safe in outdoor work. Also shows are a safety indoor work shoe and a women's safety-toe saddle shoe.

Foot, Toe & Shin Guards 359
Ellwood Safety Appliance Co. Illustrated folder gives data on a variety of aluminum, steel and fibre guards, designed to be worn over shoes or clothing for the protection of toes, feet, shins and knees. Units can be worn seperately or in combination.

MAINTENANCE

Chemical Specialties for Industry 360
Huntington Laboratories, Inc. This new 36-page booklet lists scores of new sanitation products to meet today's changing demands as well as standard maintenance and floor finishing items. Among newer products are: conductive wax, indicator soaps, medicated soaps, flame-retarding compounds, plastic stain removers, lubricant base soaps, etc.

Chemical Rust Disintegrator 361
Service Industries. A liquid solution that removes rust chemically and fortifies metal against further rusting both indoor and out is featured in this 4-page bulletin. The folder also describes a rust preventive for indoor use, a heavy duty preventive for outdoor use, and an acid-proof plastic coating.

(Continued on next page)

SPECIAL OFFER BELOW VALID ONLY FOR THREE MONTHS AFTER PUBLICATION DATE.

READER'S INQUIRY CARD

HOW TO GET FREE DATA! **(No Postage Required)**

ADVERTISED PRODUCTS: Just insert the key number shown under each advertisement in the boxes below.
NEW PRODUCTS ("WHAT'S NEW" PAGES): Insert the key numbers shown on each item.
FREE BULLETINS & CATALOGS: Insert the key numbers shown on this page.

August, 1955

Please send me the following free data (Remember to fill in your name and address.)

PLEASE PRINT

Name _____ Title _____

Company Name _____

Street Address _____

City _____ Zone _____ State _____

Free Bulletins (Cont'd)

NOISE CONTROL

Audiometer Instruction Manual .. 362
Beltone Hearing Aid Co. A pocket-size 16-page booklet which gives basic data on the use of audiometers for testing hearing. Subdivisions of the manual cover: testing conditions, audiometer controls, tests, air conduction tests, bone conduction tests, masking tone, screening tests, individual screening, group screening, fuse replacement.

Noise Simplified 363
Harmon Hosmer Scott, Inc. A detailed 18-page booklet contains information on noise measurement and control. It explains the relation of noise to hearing, describes noise measuring instruments and shows how to use them. The second section discusses methods of reducing and controlling noise. Final section gives technical data on sound measurement equipment.

Sound Barrier Curtains 364
Bemis Bros. Bag Co. Illustrated bulletin describes a fire-resistant accordion-type curtain that can be used to deaden production noise and isolate noise sources. Shows how curtains are installed and typical applications.

FIRST AID & HYGIENE

Self-Sealing Bandage 365
Caster Products Co. This bulletin describes and illustrates a self-sealing bandage for use in first aid rooms, hospitals, clinics, etc. The porous latex crepe material is easily removed without sticking to skin or hair.

Athlete's Foot Preventive 366
Onox, Inc. A foot mat saturated with a special skin-toughening solution to build up the skin's resistance to fungus attack is described in this folder. Gives details about product and outlines free trial offer.

Flexible Exhaust Hose 367
Flexaust Co. A series of five bulletins describe various aspects and uses of flexible hose for dust & fume control, air conditioning and materials handling. They cover general data, accessories, technical data, application data and friction loss data.

What's YOUR Problem?

- **Has an accident or fire interrupted production?**
- **Want to know how to prevent it?**
- **Do you need background information on equipment for industrial safety, hygiene, or maintenance?**

As a service to its readers, "Safety Maintenance" will arrange to supply manufacturers literature on the following subjects. Just insert the key number on the Readers Inquiry Card on the preceding page and be sure to fill in your name and address. If you need information on a specific type of product, simply write it in on the Inquiry Card.

Key Number	Subject
	PERSONAL PROTECTION
101	Safety Goggles
102	Face Shields
103	Lens Cleaning & Anti-Fogging Equipment
104	Sweat Band
105	Hard Hats
106	Respirators & Masks
107	Protective Clothing
108	Women's Protection Clothing
109	Safety Belts
110	Safety Gloves
111	Foot Protection
112	Anti-Slip Soles
113	Oil-Proof Soles
114	Welding Helmets
115	Welding Curtains
	FIRST AID AND PERSONAL HYGIENE
120	Protective Skin Cream
121	Skin Cleansers
122	Sanitary Drinking Cups
123	Athlete's Foot Control
124	Salt Tablets
125	Noise Analysis & Control
126	Antiseptic Medication
127	Burn Medication
128	First Aid Kits & Supplies
129	Stretchers & Litters
130	Resuscitators
	DUST & FUME CONTROL
135	Portable Ventilator
136	Dust & Fume Collectors
137	Carbon Monoxide Control

Key Number	Subject
	FIRE PROTECTION
140	Fire Extinguishers
141	Safety Cans
142	Extinguishing Ashtray
143	Safer Solvents
144	Degreasing Machines
145	Combustion Safeguards
146	Flammable Liquid Pumps
147	Fire Retardants
	LIGHTING & ELECTRICAL EQUIPMENT
150	Alarms & Warning Lights
151	Explosion-Proof Lights
152	Electrical Insulation Tester
153	Fluorescent Lamp Guards
	FLOOR & BUILDING MAINTENANCE
160	Anti-Slip Floors & Mats
161	Anti-Slip Waxes & Finishes
162	Floor Cleaning Compounds
163	Cleaning Machines
164	Oil & Grease Absorbents
165	Paints
	LADDERS & SCAFFOLDS
170	Ladders & Safety Devices
171	Scaffolds
172	Work Platforms
	GUARDS
175	Machine Guards
176	Power Press Feeders
	EDUCATIONAL AIDS
180	Safety Signs
181	Aisle Marking Equipment
182	Safety Awards & Emblems
183	Employee Safety Guide

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READER'S FREE INQUIRY CARD

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NEW PRODUCTS,

FREE BULLETINS & CATALOGS

WHAT'S YOUR PROBLEM?

IN-PLANT FIRE TRUCK

(Use Key # 982 on Inquiry Card on page 71)

THE SECO Engineering and Manufacturing Company, Inc. has devised a new industrial motorized Fire Truck for plant protection. The new In-Plant Fire Truck is designed for use in any type of plant including chemical, metal working, textile, plastic and woodworking. It combines versatility, speed and maneuverability in areas difficult of access. Each of four basic models carries at least two major "Fire Fighting Guns". Model S200 is equipped with 300 pounds of carbon dioxide and a water fog unit.

ALUMINIZED FIRE SUIT WITH BREATHING UNIT

(Use Key # 983 on Inquiry Card on page 71)

A NEW ALUMINIZED fire suit has been announced by Wheeler Protective Apparel, Inc. for fire rescue workers and incorporates an air respirator which enables the worker to breathe for extended periods of time while inside the suit. The suit is intended for such users as air stations, animal breeding farms, armed service bases, auto speedways, factories, fire stations, institutions, stables, ships, yachts, stock yards, and other places where fire rescue may be necessary.

The "Fire King" is made from aluminized tropic-weight asbestos fabric which reflects up to 90% of the heat generated in the fire, permitting rescue even in direct flame. The lining is of neoprene coated fiberglas for additional resistance to heat, abrasion, water, oil, grease and acids. This also forms an effective vapor barrier. There is a built-in Bullard hard hat to protect the wearer from head blows. A pyrex vision piece in the helmet is replaceable and is ventilated to prevent fogging.

All outside seams are concealed and inside seams are of flame-proofed tape. A two-way zipper along with takeup springs at the waist and ankles saves time in putting on the suit. The suit will fit the average height range (5'8" to 6'2"). It comes packed in a steel storage case.

The Scott Air Pak, self-contained breathing equipment, is worn underneath the suit and provides enough air for approximately 15 minutes work inside the suit at extreme exertion. The Air-Pak offers protection against gas, smoke, dust, or fumes and will operate successfully in temperatures as low as 20 below zero. Cool air, not oxygen, is used in the Air-Pak, making for safer operation in flames. Operation of the unit is relatively simple.

Also available are fire blankets and extra gloves for helpers. Extra air tanks can be obtained for the Scott Air-Pak; making it possible to have full air tanks on hand at all times, while the used ones are being recharged.

NOISELESS VACUUM

(Use Key # 984 on Inquiry Card on page 71)

THE NEW TORNADO Model 240 Noiseless Vacuum Cleaner is a combination of power supplied by a heavy-duty multiple-stage 1 H.P. motor and scientifically designed noise suppression and dissipated air discharge to reduce operating noise level. The machine uses an internal type filter. The by-pass type of motor lets cooling air move through the motor and out without coming in contact with the dirt and moisture-laden suction air.

For wet pickup, the cover is raised and the filter removed. Available with a 15-gallon stainless steel tank or a 12-gallon baked enamel tank. Other features include a water shut-off valve for safety in wet pickup, a snap lock pin for quick hose connection, double ball bearing casters with non-marking neoprene wheels.

LADDER LEVELER

(Use Key # 985 on Inquiry Card on page 71)

A SAFETY DEVICE that is said to eliminate most of the accidents in using ladders has been put on the market by H-B Industries, Inc. Called "Ladr-Levl," it is easily attached to any ladder, wooden or metal. Its self-adjusting legs adapt themselves to any terrain, no matter how uneven, and permit the ladder to stand upright securely. Slipping is prevented by non-skid, swiveling feet. For use on stairways or steps, its legs take a full 9½" riser.

When the user puts his weight on the first rung, the mechanism locks automatically in place, and can be unlocked only by hand. The Ladr-Levl has been use-tested for a number of years by painters, glaziers, contractors, electricians, public utilities, maintenance men, outdoor advertising firms, and construction companies. It has been in rigorous daily use under the supervision of university research workers to test its safety and dependability.

Other important advantages are: the weight of the ladder is always directed downward along the side rails, eliminating lateral stresses; it can be easily installed by the purchaser, and can be transferred from ladder to ladder. It eliminates makeshift, unsafe leveling devices, such as wood blocks or bricks. It is manufactured to a minimum 1,000 lb ladder load test, is fabricated of a special aluminum alloy, and weighs only 5 pounds. It is guaranteed for a full year.

RADIATION & BURN TREATMENT

(Use Key # 986 on Inquiry Card on page 71)

AN OINTMENT made from the sap of the tropical Aloe vera plant, lanolin and petrogel, is now available for industrial clinics in treating burns of all kinds. Known as Collins Aloe Ointment, its original application was in the treatment of roentgen-ray burns. Subsequent tests indicate it is effective in the treatment of other burns due to radiation exposure, such as atomic ray, beta-ray, X-ray, gamma-ray and the sun's rays, as well

as chemical, hot metal, electrical, steam and abrasive burns.

According to research reported by Drs. C. C. Lushbaugh and D. B. Hale of the Los Alamos Scientific Laboratory, the ointment is the most satisfactory and successful remedy for the treatment of the devastating skin and tissue damage caused by atomic bomb explosions and in the treatment of burns resulting from exposure to beta irradiation.

Made by Collins Laboratories, Inc., the Aloe Ointment is available in 12 oz. jars designed especially for industrial clinics and hospitals. Trial 1 oz. tubes are also available at low cost.

HANDY USE MALLETS

(Use Key # 987 on Inquiry Card on page 71)

SEVEN DIFFERENT sizes of wooden mallets for production and maintenance work are offered by LaPierre-Sawyer Handle Co. Sizes range from 1¾ to 3½ inch diameter heads. Made of Pure Seal Brand Hickory, including the handles, they are designed to last many times longer with safety for tinners, plumbers, maintenance men, precision work, electricians, woodworkers, etc. The eyes of the handles were made to fit tight and are glue-dipped before driving into heads. They are coated with a clear lacquer and each size has a different colored tip on the handle.

NEW CONCRETE FINISH

(Use Key # 988 on Inquiry Card on page 71)

A NEW MULTI-PURPOSE concrete sealer-finish has been developed by the makers of Johnson's Wax. The new product, called Conq-r-Dust, is for use on cured or uncured concrete and other masonry-type floors. It is designed to eliminate dusting on concrete floors and make sweeping and other care easier. No floor neutralizing is necessary on uncured concrete. The product dries in 20 to 30 minutes and can be maintained by mopping with a weak cleaning solution.

The product can be applied as it comes from the container with no preparation or mixing required. It also is water resistant and provides a good gloss to improve the appearance of the floor. Wax or paint can be applied over it and resilient floors can be laid over it. It is slip-retardant, has practically no odor and is nearly colorless.

SAFETY PROMOTION KIT

(Use Key # 989 on Inquiry Card on page 71)

TO ENCOURAGE industrial workers to attain safety goals, a guide to Safety Promotion has been developed by Organization Services and will be sent without charge to readers. Some of the new approaches include safety calenders, various safety novelties, safety ribbon sets with a special slogan for each month of the year (shown here), all available from the company. One novel promotion idea is a safety totem pole which shows safety campaign rivalry between various departments.

SAFETY PRESCRIPTION GLASSES BY MAIL

(Use Key # 990 on Inquiry Card on page 71)

WALLACE OPTICAL CO. has recently put into effect a wider distribution plan for their Wallace Eyeguard prescription glasses. Interviews in plants throughout the country, especially those somewhat removed from major industrial centers, indicated a definite need for a faster, better safety prescription service.

The company feels that their experience in serving the exacting requirements of the automobile plants makes possible the successful servicing of accounts anywhere, through the mails. As Bausch & Lomb Distributors, they use B & L materials in the fabrication of all their safety prescription glasses.

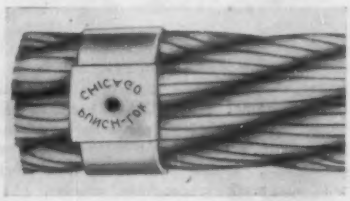
A strong appeal to welders and grinders is made by the company's claim to supply lenses that will last up to seven times longer than usual, by virtue of a crystal clear coating called TUF-COTE, that resists the burning and pitting normally encountered in these occupations.

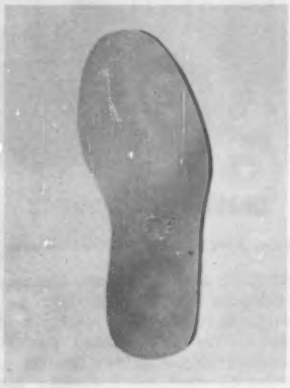
HOSE CLAMP USED FOR SEIZING WIRE ROPE

(Use Key # 991 on Inquiry Card on page 71)

A QUICKER, tighter seize for cutting wire rope can be obtained using Punch-Lok hose clamps made by the Punch-Lok Company, according to the clamp manufacturer. Cutting wire rope without first seizing it securely, can throw it out of fabricated position and result in kinks or doglegs.

Seizing with hose clamps prevents movement of the strands during cutting operation. On stress-free preformed rope only one clamp is needed on each side of the cut. Clamps can then be removed or left as a permanent seize if needed.





NEOPRENE SHOE SOLE

(Use Key # 992 on Inquiry Card on page 71)

A DRESS-TYPE neoprene industrial sole has been introduced by the Gro-Cord Rubber Co. The "Neo-Nuclear" sole is a long-wearing stitchable material that has all the desirable and proven features of the conventional neoprene sole including resistance to oil, heat, acids and caustics. It was developed to fill the needs of plant executives, foremen and others who must work in both office and plant and who need a sole that withstands plant conditions and still looks dressy enough for the office.

FIREFIGHTING TRAILER

(Use Key # 993 on Inquiry Card on page 71)

HENRY H. PARIS Distributor, Inc., has recently placed on the market a completely self-contained firefighting trailer. The steel body of the trailer carries 360 gallons of water. It has 4 wheels, mounted on 2 level load axles to provide knee-action and smooth traveling. The low center of gravity makes it practically impossible for the trailer to overturn.

The top sides and fenders are made with non-slip steel floor plate for safety. Mounted atop the trailer body are a high volume, high pressure pump; hose reel; 100 ft. of 1" high pressure hose; 150 lb. dry chemical tank with 50 ft. of hose; 30 lb. hand extinguisher; valves and all

controls. Thirty feet of 2½" suction hose is carried in a special compartment at the rear of the trailer.

The valve and piping arrangement permits pumping water from the trailer tank, or picking up water from a pond, reservoir, stream, or directly from a fire hydrant. Water can also be taken from these sources to refill the tank. The dry chemical tank is pivot mounted so that it can be raised to an upright position, and latched in place, for refilling. The trailer is equipped with electric brakes, rear and side lights, and quick latching safety hitch.

ALL-PURPOSE ABSORBENT

(Use Key # 994 on Inquiry Card on page 71)

THE TRU-SORB CORP. recently introduced on the market a new, quality, all-purpose, mineral floor absorbent called "Super Tru-Sorb" which carries the Underwriter's Laboratories seal of approval. It has powerful absorbent qualities which will dry slippery and hazardous floor areas rapidly, making them clean and safe.

Based on performance tests conducted by a major scientific testing company, the product is said to absorb more liquid and retain its bright color when saturated. It will also cover more floor area due to its combination of low specific gravity with the proper grain size.

The new absorbent is completely harmless to those who use it and it does not damage clothes or floors as it is non-toxic, chemically inert and non-combustible. It is a universal floor absorbent in that it absorbs oil, water, grease, chemical solutions, paints, acids, inks, food wastes and other liquids. It is ideal for use in industrial and chemical plants, machine shops and garages, passenger and freight terminals, bottling plants, institutions, public buildings and parking lots, etc.

NON-SKID PLASTIC FINISH

(Use Key # 995 on Inquiry Card on page 71)

IMPROVEMENTS in its "Skid-Not" colorless liquid plastic floor finish that makes it easier to apply as well as skid-resistant, even when wet, are announced by The Monroe Company, Inc. New ingredients have produced a glossier, self-leveling finish that will not pile up or streak. The liquid plastic can be easily applied with mop or applicator. It dries within 20 minutes and is claimed to wear 3 to 5 times longer than wax. Completely transparent, it does not, in any way, change the color of flooring.

It is recommended for use over asphalt and rubber tile, linoleum, cork, terrazzo, magnesite and varnished, painted or enameled wood floors. When used after Monroe Wax and Oil Remover, it can be effectively applied over floors that have been previously waxed or oiled. It is especially suitable for offices, manufacturing plants, churches, restaurants, gymnasiums, theaters, public buildings and hospitals. Rubber skid marks and traffic stains can be easily washed off. It is noncombustible and nonflammable.

IMPROVED SOUND LEVEL METER

(Use Key # 996 on Inquiry Card on page 71)

A NEW, IMPROVED model of the 410 Sound Level Meter has been announced by H. H. Scott, Inc. This new model, the 410-C, features a separate output stage for driving sound analyzers, peak noise indicators, graphic level recorders, and other accessory equipment. This makes unnecessary the switching off the 410 indicating meter movement to avoid introducing distortion caused by the rectifying action of the indicating meter. Circuit changes have also been made to improve the operating characteristics.

The 410-C is used for accurately measuring noise, sound and vibration from equipment such as blowers, ventilating fans, or aircraft and in industrial hygiene studies and acoustical surveys.

This instrument features a very rugged, compact design. Unusual portability is made possible by the use of subminiature tubes and components, and patented miniaturization techniques. The meter meets all specifications of the American Standards Association for Sound Level Meters. The sound level range is from 34–140 db above the standard ASA reference level of .0002 dynes per square centimeter. It uses readily obtained hearing-aid batteries with an operating life of about 50 hours and is available with a wide range of accessories, including vibration measuring equipment, acoustic calibrator and peak noise indicator.

SAFETY SLOGAN CUPS

(Use Key # 997 on Inquiry Card on page 71)

THE DIXIE CUP CO. offers an attractive, effective series of safety design messages on its various types and sizes of Dixie Water Cups. The designs and slogans have been developed carefully to give them a strong impact upon the users of the product on the job.

Each time workers pause for a drink of water, they are subjected to a safety message, thereby helping to keep safety foremost in the minds of the workers. In addition, it has been found that industrial workers need to drink enough water on the job to combat fatigue dizziness and to maintain their best working efficiency. The use of sanitary drinking cups at all water coolers encourages the water drinking program.

Thirty-six different safety messages printed in a series, and assorted within a tube, are available at no increase in cost.

SILICONE SKIN CREAM

(Use Key # 998 on Inquiry Card on page 71)

A NEW siliconized formula that the manufacturer claims gives double the effectiveness is now being offered in Go-Jo Protective Skin-Coat. The product reduces industrial dermatitis by developing a protective barrier to prevent infectious ingredients from penetrating the pores of the skin. Upon application, it protects hands like an invisible glove, retaining hard-to-remove ingredients on the surface and stopping penetration of grime, paint, inks, carbons, adhesives, detergents, etc. Samples available from Gojer, Inc.

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CESCO

RIGHT... before your Eyes!

Auxiliary Filters

PREVENT CLOGGING OF CARTRIDGES

Auxiliary cellulose filters, now available for the CESCO No. 99 ORGANIC VAPOR RESPIRATOR, prevent the clogging of cartridges during paint spraying operations. Together with the dual 85 cc cartridges they provide high absorptive capacity and low resistance to breathing.

These low-priced filters are easily attached by merely unscrewing the cartridge retaining ring. Filter pad and retainer are placed over cartridge, and ring is screwed back on. It's quick, and no tools are required.

The "double-duty" CESCO No. 99 Respirator has a soft rubber facepiece which provides a snug, leakproof fit with minimum headband tension. Eye protection may be worn conveniently as the respirator sets low on the face.

Order from your nearby CESCO safety equipment distributor or write us for further information.

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CESCO

CESCO FOR SAFETY

(For details, use Key # H-33 on card on page 71)

MERCUROCHROME®

for first Aid

Neglect may cause infection, which can be prevented by prompt use of Mercurochrome.

No antiseptic has been proved to be more effective than Mercurochrome.

Thirty-four years of extensive clinical and lay use has proved the value of this popular antiseptic.

Thantis LOZENGES

First aid for throat irritations...

Thantis Lozenges relieve pain promptly—reduce infection—act prophylactically.

Sore throats due to coughs and colds, if neglected, may result in lost man hours of work.

HYNSON, WESTCOTT & DUNNING, INC., BALTIMORE 1, MARYLAND

(For details, use Key # H-34 on card on page 71)